

VOL. XIII, NO. 1 JANUARY 1975

DEVELOPMENT DIGEST

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We would appreciate comments of an editorial nature and suggestions of material for possible inclusion in the DIGEST. Please address:

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1525 - 18th Street, N. W.
Washington, D. C. 20036

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Use of funds for printing this publication approved by the Director of the Bureau of the Budget June 2, 1966.

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DEVELOPMENT DIGEST

A quarterly journal of excerpts, summaries, and reprints
of current materials on economic and social development

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Prepared by the NATIONAL PLANNING ASSOCIATION

for

Agency for International Development, U. S. Department of State



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LIVING WITH INFLATION?

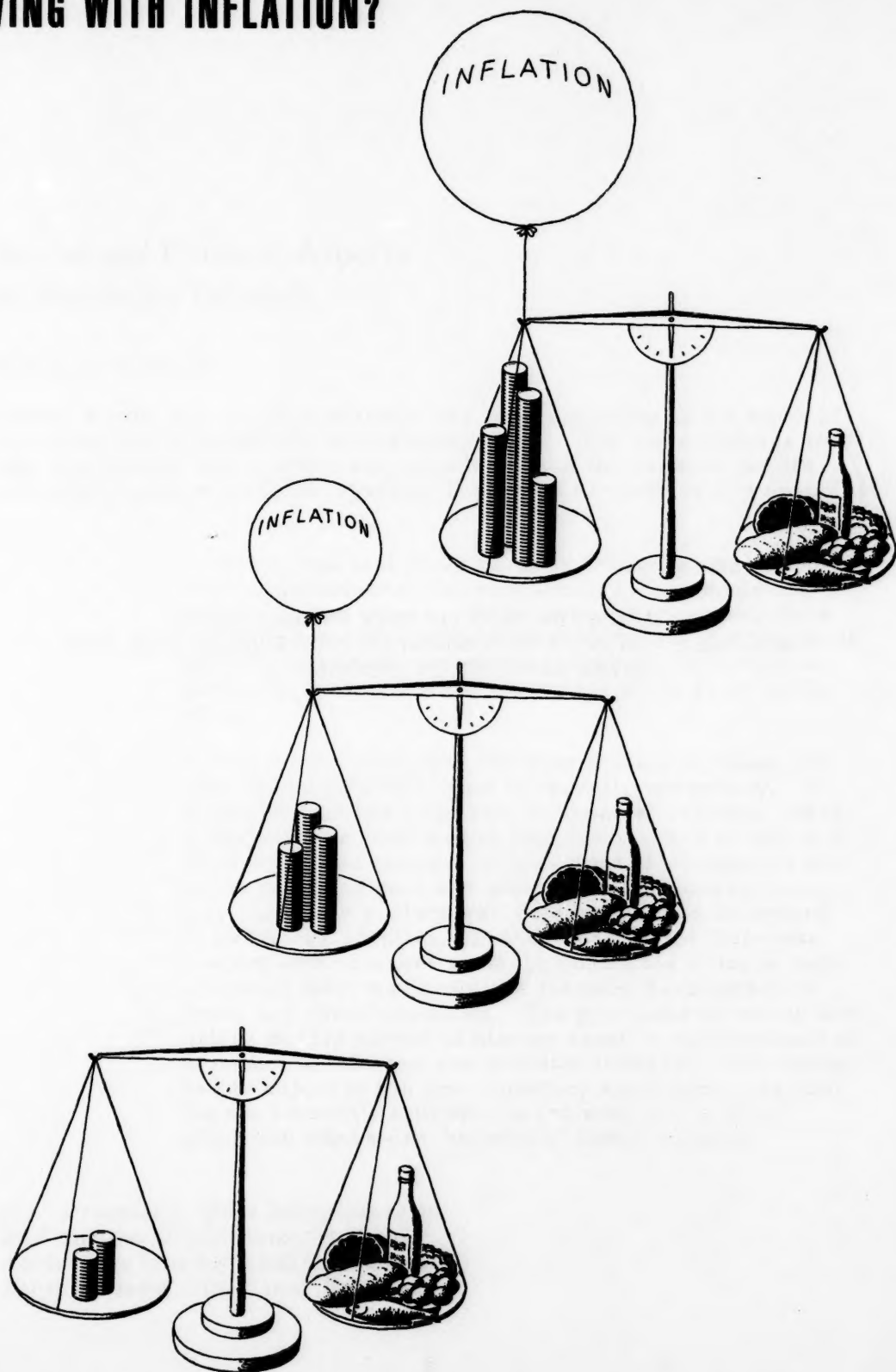


ILLUSTRATION OF THE INFLATION
PROCESS SHOWING INCREASING MONEY PRICES FOR THE
SAME AMOUNT OF GOODS.

Social and Political Aspects of Persistent Inflation

Irving S. Friedman

[Since World War II price inflation has been occurring in all types of countries and at generally accelerating rates. The major causes for this widespread phenomenon are examined, and the reasons for its harmful impact on political systems if allowed to continue are described.]

During the last three decades, country after country has experienced the problem of continuously rising prices and wages. While some governments have succeeded in slowing the rate of increase, for the most part the increasing trend continues and appears to be gathering momentum and spreading to all parts of the world.

For many centuries, the phenomenon of rising prices, called inflation, was essentially temporary. It occurred in many countries for special reasons, mainly major wars such as the Napoleonic wars or the U. S. Civil War, and because of occasional increases in the world supply of gold and silver. In the sixteenth century European society was rocked by large increases in its money supplies. Prices rose in one European country after another as large quantities of these metals found their way from the Western hemisphere to Spain and other countries. The problems of money and prices at this period of history came to the forefront of attention of thinkers and political leaders. Everything had to adjust to the new monetary conditions —including the Church's attitude toward what was a "just" price and what were "usurious" interest rates.

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Since the sixteenth century, however, inflation has been neither persistent nor all-pervasive, until the last three decades. For many, inflation became synonymous with periods of prosperity, welcomed as a stimulant to industry and commerce. Those who held wealth in forms which lost their purchasing power as prices rose — like loans to individuals or government bonds — were hostile to inflationary trends, even temporary ones. Those who were in debt, and those who held wealth in other forms like land, often were content when such trends appeared. But, with occasional exceptions, the fact that inflation in these centuries repeatedly proved temporary and limited in the number of countries simultaneously experiencing these trends deprived inflation of the great significance which it had had in the sixteenth century.

Thus the twentieth century was intellectually ill-prepared — and still is — to understand the modern phenomenon of persistent inflation, its world-wide scope and its societal causes and societal effects. If inflation were temporary, its causes and effects would be easily explained in terms of money and prices. Its control would be relatively simple. But the persistence of inflation makes it necessary to look deeper for causes and effects.

Continuously rising prices and wages — persistent inflation — has now been a world-wide phenomenon for more than a generation. But public opinion in the majority of countries, especially in the U. S. , has until recently tended to regard inflation as something which existed elsewhere: horrible examples of inflation were usually far off — in Brazil, in Chile, in Indonesia and Turkey. Those who recognized the existence of inflation at home took comfort in the fact that elsewhere the manifestations of inflation were much more virulent and violent: the rise in prices was greater and the injury to the economy more obvious. Moreover, it would prove to be a temporary phenomenon. But inflation has not been the monopoly of any one category of country. Indeed, one of the most thought-provoking aspects of the inflationary phenomenon is that it is found in all kinds of societies, at every stage of economic development, under every variety of government, and within all kinds of political, economic, and social ideologies. In many countries, continuing inflation has come to be taken for granted.

Prices and Expectations

The most familiar indicator of inflation is the annual rate of change in the average or general price level. Changes in consumer prices are measured by changes in the average price paid by consumers for all goods and services expressed in statistical indexes. In constructing these price indexes, recognition or "weight" is given to the relative importance of different goods and services to the "average" consumer. This "average" may be for only one or two cities when data for other areas are not available, yet it is used to represent the entire country.

Disguised price rises which are not reflected in the price index are also a vital part of understanding what inflation means for lower and middle income groups. In some countries, some prices like rent or public utilities are fixed by law or public bodies, or subsidized to the consumer. Such items are usually included in the price indexes at the official prices — even when there are black markets in which buying and selling takes place at much higher prices, and such transactions account for a large part of the consumption. In other cases, products may shrink in size, deteriorate in quality, or become less available, forcing consumers to buy increased quantities of more expensive substitutes. All have seen the phenomenon of the vanishing candy bar, which goes up in price and simultaneously becomes smaller in size. The inexpensive toy, like the inexpensive apartment or house, is either not obtainable or unbelievably poor in quality. In still other cases, part of the increased price is measured in time delays to get what is needed. In the controlled economies, failure to reflect changes in quality as well as availability of goods can be even more important weaknesses of price indexes than elsewhere. In Soviet-type economies, persistent inflation is seen more in nonprice indicators: shortages of supply, narrow range of choices, poorer quality, and delays in delivery.

With these caveats in mind, let's look at the cost-of-living indexes for some countries: During the 1950s and 1960s, using 15 industrialized countries as a sample, about half of them experienced cost-of-living rises of less than 3 percent per year and the other half higher, Japan being the highest with an average rise of over 8-percent per year in the 1950s and about 10 percent in the 1960s. This may not seem particularly high. What is often neglected is that price rises have been continuous and therefore cumulative in their effect. Moreover, they have tended to accelerate. There were virtually no cases of countries experiencing price declines from one year to another as in the prewar years. For most countries, the rate of inflation was higher in the 1960s than in the 1950s, and it has been increasing further in the 1970s.

The median rate of price increase for a sample of 37 developing countries in the 1960s was about 3.5 percent per annum, or a doubling in prices every 20 years. Countries with inflation of this general magnitude (0-5%), spanned the world: Mexico, Guatemala, and Costa Rica; Tunisia and the United Arab Republic; Ceylon, Pakistan, Thailand, and Malaysia; and Nigeria in Western Africa. Higher rates of inflation (5-15%) were also found throughout the world: Israel, Korea, Trinidad and Tobago, Kenya, and India. The most rapid inflations occurred mostly in South America: Brazil, Chile, Colombia, Argentina, and Uruguay. These countries experienced price inflation varying from 15 to 50 percent per annum. But the worst case of the 1960s was in Indonesia where inflation reached over 1000 percent per year.

The disruptive effects of inflationary expectations might be regarded as minimal if the public could expect more or less regular price rises of 1 percent or more. In practice, however, inflationary expectations of 1 percent or so set the stage for higher rates of persistent inflation; they lead repeatedly to redefinitions of "acceptable" rates of persistent inflation. This has already happened in a number of industrialized countries in the postwar period: acceptable rates have climbed from 1 percent to 2, 3, to 5 or 6 percent, or even more. In industrialized societies the eventual disruption, or at least very serious disturbances of the economy and the entire society can be experienced at rates of increase much closer to what is now considered "normal" by many. In 1972, for example, the United Kingdom was experiencing inflation of 10 percent after a long period of much lower annual rates of price increase [and the rate has increased further since this text was written]. Rates of 10 percent and more per annum are viewed with equanimity in a number of less developed countries — Korea, not to mention again old veterans of persistent inflation like Chile.

To take the argument a step further, imagine the U. S. or Canada, or Japan, or Western Europe experiencing 15 to 50 percent inflation per year — rates experienced in parts of the Third World. If they did, such countries would be even more rapidly and profoundly shaken than the Third World countries where persistent inflation has brought with it political and social consequences disrupting the environment necessary for sustained social and economic progress.

Money illusions. Experience with inflation after World War II points to another hard, stubborn fact: to many people rising prices and rising money incomes remain synonymous with prosperity. In fact, increases in national output and incomes may be largely "nominal," that is, measured in money, rather than in goods and services actually produced and consumed. Nonetheless, money illusions are not recognized for what they are. "Money illusions" mean that people are overly impressed by money income, value, costs, and so forth; they are therefore deflected from examining other aspects. Thus, in many countries, particularly when production and incomes are rising faster than elsewhere, the fact that rapidly rising prices can endanger the continuation of upward trends is lost in the exuberance of a Wild West "let-'er-rip" spirit. Countries throughout the world have repeatedly undergone such phases.

The money illusion affects the attitude toward giving and accepting bank credit. If inflation is at 8 percent per year, a borrower paying 11 percent interest per year (the nominal rate) can service his debt if he uses the credit to yield a "real" return of more than 3 percent, the "real" rate of interest; in addition, inflation is likely, by itself, to bring him additional money income. People have continued to talk of interest rates as high, unacceptably high, even though the continuing rises in prices meant that borrowers would have no difficulty in paying much higher

rates. In fact, credit has been very cheap. The amount of the loan principal becomes relatively less significant as the inflation greatly increases money earnings while loan repayments remain fixed. Banks observe that inefficient firms survive in inflation, perhaps not as well as efficient firms but well enough to pay interest on loans. Even if repayment requires new borrowing, the burden of the new loans also erodes as the inflation continues. Banks can therefore be less cautious in extending loans. Firms can look with equanimity on increasing costs, including wages and interest, since bank credit will help finance such difficulties.

A more subtle manifestation of the "money illusion" is the eagerness with which people welcome devices designed to make inflation more tolerable but do not attack its underlying causes or eliminate its effects. Thus, devaluation of the currency of the inflating economy by changing the foreign-exchange rate makes inflation more tolerable because exports remain internationally competitive. With continuing inflation, however, devaluation will prove only temporarily effective; the domestic situation, employment, output, and price, may become even worse; the devaluation will have to be repeated, or the exchange rates will have to be set free to float or fluctuate. The balance-of-payments deficit then disappears, but the other harmful effects of inflation remain.

Cost-of-living adjustment clauses in wage contracts do make inflation more tolerable, at least for those who get sufficient adjustments to offset price increases. They may well give the impression that incomes in general are being defended from erosion of their purchasing power, and thus weaken public demand to end the inflation. In fact, the incomes of only a few are fully protected by such cost-of-living clauses; most are not. Cost-of-living allowances not only reduce the number who are interested in effective anti-inflationary policies, but because they perpetuate acceptance of inflation, they strengthen inflationary expectations — the most intractable element in modern inflation. They illustrate the vicious circularity of the inflation phenomenon. As long as inflation is deemed likely to continue, it is impossible to oppose cost-of-living adjustments, but these adjustments will continue to raise costs.

Speculation, hedging, and the flight of money. Persistent inflation is generally characterized by increased speculative activities: in land, in buildings, in goods, and foreign exchange. Speculation, induced by continued inflation, only feeds the fires of inflation. Under noninflationary conditions, speculation, in the sense of buying or selling commodities in anticipation of future changes in prices, may help to make market conditions more orderly. Under inflationary conditions, however, speculation may simply mean withholding goods from markets in anticipation of further price rises, thus increasing the gap between

demand and supply. Important amounts of scarce goods may be kept off the market for hoarding. Speculative activities no longer seem as risky against the background of continuing price rises.

Hedging against inflation means seeking assets whose nominal or money value is likely to go up with prices. Caution causes the hedger to switch out of liquid assets, like savings deposits or government and corporate bonds. He maintains the purchasing power of his accumulated savings by putting them into real property like buildings or land. The "speculator" seeks more than merely to defend the purchasing power of his investment: he may look for assets likely to rise more than the general price level. Alternatively, he may seek business opportunities as "tax havens," minimizing taxes because as money income rises, his marginal tax rates climb to levels he has never experienced before. Or, discouraged by the frequent "stop and go" behavior of an economy experiencing continuous inflation, he may decide to invest elsewhere. Capital flees the country. This happened in France in the chronic inflation years of the 1950s, and repeatedly has plagued other countries — Argentina, Brazil, and Chile — throughout the postwar period.

In countries with sustained inflation, investments in land, particularly in urban properties or in rural areas close to urban centers, become major business activities. Land values can be relied on, as a rule, to rise with or faster than the general price level. Speculative purchases of land attract capital which would otherwise have been used in producing goods. Closely related is speculation in commercial and luxury apartment buildings. Widespread squalid housing surrounds pockets of beautiful residential areas, and handsome, shining new commercial buildings adorn the business section while older buildings are left to fall apart and decay. Visitors to Rio de Janeiro, Sao Paulo, Acapulco, Mexico City, Beirut, Accra, and Lahore have seen evidence of this phenomenon.

Inflation seems to make businessmen interested in buying and selling commodities rather than in manufacturing them. This is like Mark Twain's sack of flour in a Western frontier mining community with scarce supplies and ample money, which was sold over and over again but never consumed: so much more could be made in buying and selling the scarce flour than in using it to make bread. Uncertainty about future prices creates opportunities for extraordinary profits for those who guess correctly. Increasing numbers are prepared to back their skill and luck against others' in guessing how future prices will behave. The game is no longer played mainly by experts. Confident or hopeful novices eagerly join in; the economy becomes a huge roulette wheel.

Governmental controls over the purchase of foreign exchange to make payments abroad provide special opportunities for speculation.

Frequently, a country is unwilling to devalue its currency, despite continuous domestic inflation at rates higher than those in other countries, so that foreign-exchange supplies need to be rationed according to some system of priorities. Import or foreign-exchange licenses granted by the government authorities became valuable properties. They entitle the holder to obtain scarce goods or services which command premium prices in the domestic market. A market arises in the exchange licenses themselves. Profits are sought from exploiting the ability, legally or otherwise, to obtain these licenses. Inflation turns productive and sound businessmen into foreign-exchange speculators, and leads to widespread corruption in the administration of import controls.

Repercussions for Political Systems

Persistent inflation has profound implications for political systems. Because of social difficulties it fosters, as well as its harmful income-distribution effects, inflation creates grave problems for modern governments while at the same time it weakens their capacity to solve these problems. The direct reasons are found in the impact which the persistent inflation has on the attitudes and behavior of those at all levels of government whose activities provide the framework within which all private activities take place. Indirect reasons arise from the instabilities affecting real incomes of all groups, leading them to a continual struggle with one another to maintain their living standards. The fruits of this struggle go disproportionately to the successful speculators, while the majority of lower income receivers tend to fall behind. In addition, the "demonstration effects" of luxury consumption by the former group make poorer people more vividly aware of what they are not getting and they may become chronically dissatisfied.

Vulnerability of modern societies. The size, complexities, and weblike interrelations of activities of modern economies and societies result in many "critical" points where social and economic life can be disrupted by the malfunctioning of public systems, such as electric power and water supply, garbage collection, transportation, policing, and teaching. At these critical points there are people, not just machines. Without the effective performance of these people, societies can be brought to a standstill. Yet it is these people who are very often hard hit by inflation and whose strategic importance must be recognized.

Persistent inflation thus exacerbates relations between labor and government, perhaps even more than those between labor and private management. Labor disputes now occur quite commonly in occupations in which they had previously been rare events — protests are heard from police, customs officials, teachers, sanitation workers,

prison guards, public utilities. The unconscious assumption that all sorts of activities, disputes, and changes can take place within a society, and that "someone" will still take care of the essentials is no longer valid. Ironically, this change in the character and attitude of public servants and the decline in the public regard for government have come at the very stage in history when government has assumed the leading role in society.

Tax revolt and expenditures ambivalence. Surveys indicate that despite the increased expenditures for public services in the United States, as elsewhere, taxpayers complain constantly that they pay more for services that are at best no better than five years ago, and often worse. Taxpayers have also become much more sensitive about who benefits from these expenditures — an element of increasing selfishness that does not augur well for the future. The citizen sees himself pounded by two stones — the one, the reduction in the purchasing power of his income; the other, the decrease in after-tax income as experts figure out new ways to obtain revenues for government. The taxpayer becomes an angry citizen open to emotional appeals for irrational behavior. Instead of directing his wrath against the harmful and unnecessary inflation, he often attacks the taxes which are needed to pay for the very public services which he strenuously advocates. These sentiments are world-wide.

The remedy, of course, is a reduced and balanced budget. The finance minister, often in alliance with the head of the central bank, usually leads the crusade to keep down government expenditure. These monetary and financial officials are those who must find funds to finance expenditures; as such, they find themselves in repeated confrontation with other government departments. The head of the central bank must be concerned about the internal price effects and external (balance-of-payments) effects of government expenditures, particularly — as often happens — where any resultant budget deficits must be financed by increases in money and credit. With these responsibilities, he inevitably advocates relatively cautious and conservative budget policies. So do ministers of finance, unless they get politically ambitious!

The line-up, however, is lopsided. Other agencies have constituencies which look to them to spend more, not less; and the public applauds the general prosperity, or the special group improvement. Agricultural groups, students, civil servants, and those with government contracts — road-construction companies, builders, suppliers to the military, teachers — all find support for expenditures on their behalf. Firms, trade unions, family relations, community leaders, politicians, publicists, and so forth all can be relied upon to champion their cause. In the end, while budget balancing may be popular as a political slogan, in practice it is the needs of any special group that are considered paramount and virtually irreducible. Consequently, the direction of change

in government expenditures is generally upward. The only questions are: How much? How fast? How steadily?

The recourse to the rhetoric of promises does, however, have the virtue of saving face for political leaders, aware of the repercussions of inflation and high taxes but unable for political reasons to act. Where government is held responsible for providing employment, even relatively small-scale unemployment attributable to government actions becomes political dynamite. When, occasionally, effective action to reduce government expenditures is taken — increased bus fares in Mexico, partial elimination of redundant labor in the Argentine state railways, reduced rice subsidies in Ceylon, cutbacks in certain defense contracts in some American cities — the political fallout is very great, even if other governmental expenditures continue to rise. The fact of unemployment in the affected enterprises is not offset by the fact of work for others elsewhere. Similarly, once having accepted responsibility for a level of food consumption, it is most difficult to withdraw from this commitment. On some grounds it may seem obviously logical to do so, but not to those who rely on the government assistance; for them, increased self-reliance means sudden, often severe hardship.

Stabilization attempts. From time to time, governments adopt anti-inflationary policies. At the outset, anti-inflation or stabilization measures may have popular support; the public has suffered from continuing inflation and welcomes the prospect of a reduction in the pressures.

In many cases, however, such stabilization efforts prove to be only temporary successes; they fail to overcome the obstacles created by persistent inflation. Employees in both the government and private sectors, though hopeful, remain skeptical that the inflation will end; often they have experienced failures of past efforts. They continue to push for higher wages and their case often is very strong. Political leaders find it most difficult to resist such demands. If the budgetary situation improves, political leaders are pressured to use this improvement to increase expenditures. Businessmen, showing the same skepticism of success as others and loath to be caught in unprofitable activities if the stabilization measures fail, may well adopt a wait-and-see attitude before making new investments. Increased unemployment appears in some areas, and is feared in others. Those in activities profiting from persistent inflation, of course, oppose stabilization. Political opposition to the government usually cannot resist taking advantage of these complaints and the skepticism, even though they know that success of the stabilization would make them more able to govern effectively in the future. In brief, the programs often are given up because too many believe that their interests are served by high government expenditures and freely flowing bank credit, or

governments prove incapable of correcting the inequities of the past inflation.

Unless a visible improvement in these inequities can be made and the problems of increased unemployment and business decline can be kept within politically tolerable limits, the anti-inflationary policies fail. Instead of selective wage increases to correct inherited wage distortions, wages in general spurt upward, particularly of those in stronger bargaining positions. High rates of government expenditures then continue and even increase. The effect of the past high levels of expenditures is to perpetuate the apparent need for them, despite their inflationary effects. The rising trend in government expenditures is thus more than a reflection of rising prices and wages; the conviction is strengthened that maintenance of politically acceptable economic conditions requires such a trend.

This scenario of the fate of stabilization programs is, of course, highly summarized and simplified. Each program has had its own special features, turns, twists, and, of course, results. But the basic sequence of the scenario has been often repeated. The history of stabilization programs underlines the point that, in the public mind, the government makes or breaks national prosperity. And no postwar government, at least none in the Western world, has been able to survive a public view that it is prolonging a recession.

Budget and time lags. Generally, legislatures enact budgets, although the degree of executive influence over legislation varies greatly. Whether there is a presidential or a parliamentary system, the cabinet must and does pay close attention to the wishes and needs of the members of the legislature who are influenced by pressure groups and special interests in their constituency. This is seen repeated when "bread and butter" issues like employment, taxation, welfare measures, and prices are considered. Negotiation of these issues is difficult and causes long delays in the enactment of budgets. Some legislatures have no majority party; the leadership is formed by a coalition of parties. Legislative majorities are then hard to achieve and at least feared to be easy to lose. Budgets, moreover, frequently cause the coalition to collapse —and a "safe" budget and an anti-inflationary budget are only rare coincidents. It is easier to "give" something to everyone in a coalition than to "take" something from one or all. Even military governments find their budgetary actions the subject of intense public discussion and political opposition and are sensitive to public reactions to their budgetary policies.

The budget itself is a sluggish instrument of policy. Given the importance of the public sector in many economies, and the difficulties it faces in making important changes in taxation and expenditures, it is not surprising that budgetary actions are hard to keep in tune with a

dynamic, changing economic situation. By the time a tax program to encourage investment or consumption is passed, it may well prove too little and far too late. Budgetary actions are frequently like trains going over mountains — round and round on slopes engineered to avoid slipping backward, with much huffing and puffing, and seemingly no way of going faster without risking complete breakdown and wreckage.

Even after budgetary actions are adopted, their implementation usually takes some time. Changes in corporate or personal income taxes take time to have important effects. The taxes are usually collected months after the measures have been passed —and even more months or years after they were first introduced. Similarly, certain expenditures like road-building, public housing, bridges and schools take years to implement. Certain tax rates can be increased and the increased taxes collected with relative speed; this is true of excise taxes on consumption goods or turnover taxes at various stages of the productive process, among others. These means may, however, be ill-suited to the economy's needs. Further, they may meet political and social opposition; sales taxes that are applied uniformly are "regressive" —they impose relatively greater burdens on lower-income groups. Other expenditures can be rapidly implemented and have quick effects on the economy; increases in pay, welfare payments, and pensions are examples of this.

On balance, though there may be theoretical symmetry between quick-acting and slow-acting budgetary activities, the political attitudes toward these measures are most asymmetrical. A pay increase for government employees can often be passed quickly and can have a quick effect, but a decrease in government salaries is seldom politically feasible, though its effects would also be quick. These limitations on governmental actions help explain why budgetary actions tend to be too little or too late in dealing with inflation. This is particularly true when inflation has persisted.

The credibility gap. This situation also helps explain another nearly universal phenomenon —the growing lack of credibility of governments. In many countries the public simply does not accept what government officials tell it. This may not be a question of disbelief; rather it is an attitude of profound skepticism. Government after government comes to office —by vote or otherwise —pledged to end inflation, reduce "wasteful" or "excessive" public expenditures, refrain from increasing taxes if not reduce them, restore external financial soundness, increase investment and growth, improve material well-being, particularly for the poorer groups. (Some regard this pattern of promises and slogans as peculiar to their country; actually, the language may differ, but the content is markedly similar from country to country.) Some of these promises are, of course, made with tongue in check, but many are not. Many are simply naive, ignore key political

facts — the difficulties of budgetary procedures, the lack of public interest and support for such legislation, the inevitable time lags between legislation and its effects even if enactment is finally achieved, and the relatively small portion of the budget that any new government can change.

The credibility gap in public economic policy is particularly significant. That is an area where the government says it can act effectively; moreover, the public expects it to perform effectively. But budgets, monetary policy, and public investment decisions are complex matters, fraught with the difficulties of decision-making and implementation.

How does one break the vicious circle of irresponsible promises, induced by a combination of ignorance and eagerness for public support, leading to inevitable failures, leading in turn to public disillusionment and discontent, and this in turn, to more irresponsible promises? The answer is not only of critical importance for eliminating persistent inflation; it affects the very viability of governments in modern societies.

[Extracted from Inflation, A World-wide Disaster. Boston, Massachusetts: Houghton Mifflin Co., 1973, pp. 3-6, 13-19, 136-151, 181-202. Copyright © 1973 by Irving Friedman.]

[Note: The author's general proposals for combatting inflation, omitted here, stress: 1) the importance of determining a nation's priorities, so that discipline can be applied in limiting budget expenditures and bank credit to levels which can be supported by available resources, since everyone cannot get what they want simultaneously; 2) developmental measures to raise output and improve income distribution. Both types of policy call for steady, persistent endeavor.]

Indexing for Inflation in Brazil

Alexandre Kafka

[Brazil has gone further than any other country in attempting to live with inflation by "indexing," i. e. using the percentage changes in the level of price indexes to make continuous proportional changes in the money values for wages, pensions, house rents, loans, taxes, and other items. The Brazilian methods are examined, and the contributions which indexing has made to the unusually high rate of economic growth in the past decade are critically assessed.]

Due to the extremely rapid inflation which had prevailed in Brazil beginning with the early fifties, some rent contracts and the progressive personal income tax schedule were indexed even before 1964, and indices played a role in wage determination. It was not until 1964, however, that indexing became generally used, although it is not universal.

Labor. Statutory minimum wage rates and government salaries had long been influenced by cost-of-living indices, as had wage negotiations and the binding awards of labor courts with respect to other wages. Beginning about 1954, however, many observers felt that the use of indices did not prevent wage adjustments that were frequently "too high," that is they exerted an inflationary pressure which was quickly and invariably accommodated by monetary expansion.

A new system of wage adjustment was established in 1964. Under the new system, all collective wage negotiations and labor court awards are subjected to

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guidelines which are established each month by the government. All contract or awards remain in force for twelve months. The guidelines are not simple price indices but correspond to a formula with three basic components: past real wages, prospective inflation, and prospective productivity increases. Guidelines based only on the first two factors are used to determine annual adjustments in statutory minimum wage rates (which are regionally differentiated, but gradually being equalized) and government salaries. The third factor is included for guidelines to wages paid in the more advanced sectors and regions.

The first component is an index designed to reestablish, on the day of adjustment, the average real wage which had prevailed over the preceding twenty-four months. The cost-of-living index is used in these calculations. It was assumed on the institution of the system that, over such a lengthy period, the rate of inflation and the money wage level (in the absence of observed guidelines) would have adjusted to each other and established that real wage level which was compatible with the extent of unemployment (and, more importantly, of underemployment) which the economy found tolerable. In other words, a money wage level set so as to produce the real wage level just described will be neither inflationary nor deflationary. A money wage adjusted to reproduce the real wage level at some specific past date, on the other hand, might either be unrealistically high, leading to unemployment, or too low.

The second component is a term reflecting prospective inflation, because it was realized that inflation would have to be allowed to continue for some time irrespective of the wage policy followed. There were three principal reasons for this: (1) in the process of dampening inflationary expectations, the formerly repressed prices should not be adjusted to their equilibrium levels at once but gradually — that is, "corrective inflation" was to be gradual. (2) There was a huge budget deficit (equal to nearly 5 percent of GNP) which had initially to be financed mainly by borrowing from the monetary authorities. (3) Long-term contracts had been entered into in the expectation of very high rates of inflation, and sudden elimination of inflation would have produced not only a liquidity crisis but also a genuine stabilization crisis. Accordingly, because of the expectation of continued inflation, half of the prospective rate of inflation for the next twelve months was added to the money wage established in accordance with the basic formula. On the assumption of a linear monthly increase in prices, this is, of course, exactly the addition which would maintain average real wages constant over the twelve-month period.

Even after the principal controllable independent factors of inflation had been largely eliminated, some allowance for prospective inflation was maintained. This was done mainly to preserve government credibility in the event that price increases should result from

either an unforeseeable or uncontrollable cause (like a bad harvest or a world price increase) or the pursuit of a credit policy designed, despite its gradual disinflationary stance, to avoid any liquidity crises.

In the first years of the new system, prospective inflation was repeatedly underestimated in setting guidelines, so that real minimum wage rates — as well as average wages in some sectors — were decreasing. Therefore, in 1968 the formula was revised in one fundamental respect. The money wage adjustment henceforth was based not on the actual average real wage of the preceding twenty-four months, but on what the real wage would have been if the prospective inflation had been correctly estimated at the time of the preceding adjustments.

The third component is a term reflecting the expected economy-wide increase in productivity per worker. Since Brazil was then and is today in some respects a labor surplus economy, where the absorption of unemployment and underemployment requires emphasis, the prospective productivity increases for incorporation into money wage adjustments must be conservatively estimated, if, given the degree of price inflation to be tolerated, one is to avoid jeopardizing employment creation and thereby overall growth. It is with the same objective in mind that the adjustment of minimum wage rates, which for some years now have directly affected only unskilled labor in the less-developed regions of Brazil, takes no account of productivity increases.

It is theoretically possible to produce the real wage level compatible with the desirable level of unemployment either by adjustment of the money wage or by adjusting the rate of inflation. From the practical point of view, the use of a wage formula which incorporated the terms described appeared more palatable all around. It is also clear that, whatever the effect of these terms on the rate of inflation prevailing at any one time, their incorporation in the wage formula did not prevent a gradual reduction in the rate of inflation over the years.

Social security pensions, as well as government pensions, are also indexed according to the cost of living. Although the Brazilian social security system is based on the principle of full actuarial value, the federal government is residually responsible for any cash deficits. Actually, the growth of the system has prevented any deficit problems from arising.

Capital. While the change in the system of wage determination made in 1964 was a profound one, the change in the remuneration of capital, which occurred subsequently, was even more radical. Inflation — combined with a usury law which set maximum interest rates of 12 percent — had made financial intermediation difficult. Various ways had been found to cope with these difficulties, but even the

complete elimination of the usury law and the payment of high interest rates could not have solved the problems which high rates of inflation created for the capital market. Under such inflationary conditions, the possibility that the inflation rate will change is likely to lead to such uncertainty that, other things being equal, only very small sums will be borrowed or lent at any particular nominal interest rate. The solution to the problem is to reduce uncertainties to the unavoidable minimum, namely, to an uncertainty only about changes in the real interest rate over the period of a credit or loan. This can be done by indexing the value of the loan, or bond, and this was the system gradually extended to different classes or credits or loans.

Credits or loans with variable interest rates would be an alternative method, if one could find a short-term interest rate which would be sure to reflect inflation correctly and to which the variable rate could be tied. Eurocurrency loan rates are tied to the London Inter-bank rate; the variable interest rate on medium-term securities recently issued by some U. S. bank holding companies has been tied to the U. S. Treasury bill rate. But this does not mean that the two rates mentioned adequately reflect inflation. There was certainly no appropriate short-term interest rate in existence in Brazil in 1964, and money illusion is quite capable of preventing its appearance as long as the expected rate of inflation would imply a shockingly high level of the nominal interest rate compared to the traditional range of nominal interest rates. Even where there exists an appropriate short-term rate to which a variable rate for medium- or long-term securities or contracts can be tied, other considerations may recommend indexing over variable rates. There might be a desire clearly to distinguish between real interest and the effect of inflation, for political reasons as well as for reasons related to the tax system.

At first, indexing of credits and loans — based on the wholesale price index — was applied to Treasury bond issues that firms were obliged to purchase. Shortly afterwards, owners of these bonds were given the option of receiving payments on the basis of the exchange rate of the cruzeiro in terms of the U. S. dollar, rather than on the basis of the wholesale price index. With the change in the exchange system (to be discussed later), however, it turned out that in the presence of worldwide inflation, the Brazilian wholesale price index was a much better protector against inflation than the exchange rate.

The indexing feature on Treasury bonds means that, at regular intervals, an index number is published giving the corrected nominal value of the bond, and the amount of interest payable is adjusted accordingly. At maturity the bond is redeemed in cash at its corrected value. Its sale and purchase before maturity and its acceptability as a guarantee (for example, where performance bonds are required) always takes into account the corrected value. Within a few years, the compulsory purchase of bonds had been abandoned and voluntary issues of

indexed Treasury bonds had become acceptable. Most of these bonds have relatively short maturities, from one to two years, but some have maturities of up to five years (long-term bonds have not been issued recently). They presently carry interest rates between 4 and 6 percent.

Indexing on the same basis as on Treasury bonds was also applied to mortgage bills and contracts, which has contributed greatly to the success of the Housing Finance System introduced after 1964.

Indexing is, of course, also available for other securities, including state government bonds, corporate bonds or debentures, bills, promissory notes, and loan contracts. The periodic writing up — that is, upward revaluation — of assets of corporations enables them to issue bonus shares. Corporate bond issues have been hampered because, for a variety of reasons which also affect equity issues, the market has not yet become accustomed to genuinely long-term bonds. In addition there is no incentive for industries to issue bonds rather than to obtain other financing, especially from official banks. (Official banks, in turn, finance themselves on term deposits as well as on budgetary contributions and loans raised abroad; they lend at long term and take equity participations.)

Subsequently indexing was also applied to savings deposits, and has more recently been made compulsory for time deposits of more than two years maturity. There, however, indexing proper still competes with what is sometimes called "pre-indexing," that is, the promise of a total remuneration, comprising both interest and "monetary correction," set in advance. Indexing is not applied to sight deposits (or to cash). Most loans by commercial banks, as well as finance companies and investment banks, are sufficiently short-term to be made at pre-indexed rates.

Finally, it should be mentioned that new ordinary life insurance policies, as well as so-called endowment policies, are indexed. The companies, in turn, protect themselves by investing in indexed securities, indexed mortgages, or equities and real estate.

The tax system. One of the most important applications of indexing is to direct taxes and to tax debts. For some years before 1964, the progressive rate schedule of Brazil's personal income tax was adjusted in accordance with periodic changes in minimum wages. Since 1964 the schedule has been adjusted annually in rough proportion to the cost-of-living index, although greater adjustments have been made at times to favor the lower brackets.

The most radical change in the tax system involved the corporate income tax. Even before 1964 the periodic writing up of fixed assets

had been permitted. However, the writing up was purely cosmetic because it was not allowed to affect depreciation allowances. Under the system introduced after 1964, depreciation allowances deductible from profits are based on the adjusted value (according to the wholesale price index) of fixed assets and, in addition, considerable scope exists for accelerated depreciation. Later on, the final logical step was taken by permitting the deduction from profits of the adjustments necessary to maintain the real value of working capital. Like indexing of the progressive personal income tax schedule of rates, the indexing of depreciation allowances and inventory adjustments made tax rates reasonable for the first time in many years and no longer confiscatory of purely illusory profits.

Logically, the increase in value of credit instruments corresponding to indexing is not taxable to the individual creditor (nor to the corporate creditor insofar as this is necessary to maintain his owned working capital intact) and is, like interest, a tax-deductible expense to the debtor.

Last, but not least, it should be mentioned that indexing is also applied to tax debts of all kinds. This provision eliminated the earlier incentive to delay payments since the interest rate chargeable on delays was low.

Controlled prices. Indexing also made easier the adjustment, in line with inflation, of utility rates and rents (there had been a far-reaching decontrol of prices in general in 1964). For the most part, rates in Brazil are set so as to produce net earnings equal to a stated percentage of the utility's total assets; these earnings defray all capital costs. Despite some earlier provisions to mitigate the effect of inflation, it was only after 1964 that the authorities permitted public utilities not only to write up their assets periodically but also to make corresponding increases in rates to produce the permissible rate of return in real terms. The general acceptance of indexing also made it easier in practice to adjust upwards the prices charged by government enterprises outside the utility field.

Inflation combined with rent control and usury laws had destroyed the market for rental housing, and also had greatly reduced the availability of housing finance. Even before 1964, indexed rent contracts had been permitted in certain cases. However, it was only as a result of applying indexing to housing finance that a very large increase in building activity for owner-occupied and rental housing became possible. Mortgage contracts are indexed on wholesale prices; but in the case of low-income housing, where the interest rate is also subsidized, contracts can be indexed on the minimum wage. In this case an equalization fund in the National Housing Bank is designed to absorb differences between payments due from debtors and those due to lenders which may result from any difference in the movement of the indexes (since the

obtaining of housing finance is indexed on wholesale prices). Similarly, along with wholesale prices, the minimum wage is still used for the indexing of certain rent contracts (most rent contracts are free of any control).

Exchange rates. For a period of several years (1964 to 1968), the exchange rate was adjusted infrequently in large steps, which discouraged exports by causing uncertainty and which generally led to large disturbing capital flows just before an expected change and just after a change had occurred. Since 1968, a system of small adjustments in the exchange rate at irregular intervals of between ten days and two months has been in effect. The predominant influence in these adjustments has been the differential between Brazil's inflation and the rate of inflation prevailing in its main trading partners.

Highlights of the Brazilian Economy since 1964

In early 1964, the annual rate of inflation in Brazil was over 100 percent, whereas in 1972, after an almost unbroken decreasing trend for several years, the wholesale price index rose just 16 percent, and the same rate of increase was registered in 1973. As a result both of the worldwide acceleration of inflation and particularly the abolition in March and April of most price controls and subsidies (which had been intensified in 1973), prices rose at a more rapid rate in the first five months of 1974. But the increase has been much lower beginning with June 1974, and inflation is expected to resume its gradual annual decline. Before 1964, real GNP growth in Brazil was irregular although, on average, not low. Since the end of 1967, however, it has been running at rates which have never been less than 9 percent, have averaged in excess of 10 percent — a much higher rate than ever before — and in 1973 reached over 11 percent.

Until 1964 the infrastructure of the economy grew at a relatively slow rate and exports lagged. The resulting bottlenecks and recurrent balance-of-payments crises held down the general growth rate of the economy. Since 1964, there has been a radical change. Rapid growth has occurred in the generation of electricity, in communications, in transportation, and in other aspects of the social as well as economic infrastructure. There has been an enormous development of housing construction including low-cost housing. Exports have grown spectacularly in volume as well as value.

Real minimum wage rates fell until 1968, as already mentioned; but in more recent years they have remained approximately stable, and (as noted above) have been relevant to a declining proportion of the labor force. Average real wages have increased annually at something like 3 or 4 percent and, most recently, more than that in many sectors and regions. The guidelines do not prevent larger wage increases, either for individuals or for groups of workers, as long as

productivity increases make them possible without unreasonable price increases — which would be disallowed by the price supervision machinery. The average real wage increases mentioned are less than the growth rate of the economy per head of population, and this difference reflects a choice — a highly successful choice — in favor of more rapid elimination of unemployment and underemployment.

To measure shifts in economic welfare, changes in the levels of government services rendered to the population must be added to real wages. These services include greatly increased expenditures (in relation to GNP) on education, on health, and on low-cost housing (which is subsidized); they also include the institution of schemes for non-contributory endowment policies for employees established on the basis of employers' contributions offset by federal tax reductions (Social Integration Program). The benefits derived from these services are, of course, inversely proportional to real income levels.

Some Tentative Conclusions

The effects of indexing in Brazil. The performance of the Brazilian economy since 1964 has sometimes been described as an "economic miracle." Without indexing, it would have been impossible for the sharp reduction in the rate of inflation to have been achieved simultaneously with a remarkable upsurge in growth. But indexing was not a sufficient condition for success, either in reducing inflation or in stimulating growth.

1. The relationship between indexing and the reduction in the rate of inflation is a complex one. Indexing avoids the textbook effects of inflation: inequities in income distribution, distortion of the productive and financial structures, and destruction of the incentive to save. But indexing creates feedback effects from yesterday's inflation to today's; the greater the number of sectors that are shielded from the effects of inflation, the less can the economy neutralize inflationary impulses.

Nevertheless, indexing can help indirectly even in reducing the rate of inflation gradually. By offering protection against the effects of inflation, indexing makes it possible to live with inflation and, therefore, to avoid attempts to end inflation by shock treatment. Whenever the rate of inflation is substantial, policies aimed at its rapid termination appear to fail except under fairly peculiar circumstances, and the failure then discourages further attempts to curb inflation. By institutionalizing protection against inflation on a non-discriminatory basis, indexing may also discourage excessive claims for income and price increases in anticipation of inflation, thereby making easier the reduction of the rate of inflation without recession. Further, the avoidance of the textbook effects of inflation may itself have anti-inflationary virtue: sectoral bottlenecks in production and insufficient savings had been powerful factors in Brazil since the early fifties in forcing the government and

the monetary authorities to intervene to supply deficiencies, almost unavoidably with inflationary effects.

In Brazil, the new wage formula was certainly essential in making it possible to reduce the rate of inflation. The virtue of the new wage formula was not the introduction of indexing, which was not new, but the replacement of a sometimes haphazard, and at best less rational, method of indexing wages by a more rational one.

2. It is obvious that, for growth to accelerate, it was essential for Brazil to avoid, through indexing, the textbook effects of inflation — that is, the distortions which caused bottlenecks, including those affecting the financial sector of the economy. In view of the important role which had to be assumed in the Brazilian development process by the public sector, indexing was also helpful to that sector because it rationalized the tax system and particularly because it enabled the government to borrow from the market and helped government enterprises to maintain their profitability.

3. There are other factors besides indexing which have been crucial to Brazil's economic success.

Indexing directly reduces the ability of the economy to absorb the inflationary impulses emanating from given sectors or income categories at the expense of other sectors or categories. The rate of inflation could become explosive, therefore, unless anti-inflationary policies are followed in all other respects. This requires an income policy which will attempt to protect real wages only to the point that their growth is compatible with the country's productivity increase and its employment objectives. In the presence of widespread oligopoly, it also means price guidelines for the oligopolistic sectors as an important ingredient of the anti-inflationary strategy. Furthermore, it means demand management that will validate this price and incomes policy — neither more nor less. While this basic requirement of demand management was observed as a general rule in Brazil, monetary policy had a distinct bias towards avoiding liquidity crises; demand management, insofar as it did err, did not do so on the side of restraint. This fact made the use of price and wage guidelines indispensable to the anti-inflationary strategy, whatever might have been the case otherwise.

In demand management, improved tax administration and expenditure control played an essential role in reducing the cash budget deficit from a high proportion of GNP to a negligible one. Equally important has been the control over internal credit and later, when capital inflows from abroad became important, external credit. Control over internal credit has been very largely a matter of institution building, including the establishment of the Central Bank and the National Housing Bank, the development of new types of private financial

institutions, the Social Integration Program, and so on. The development of new credit instruments has also been important; they include, in addition to the indexed varieties already mentioned, short-term, nonindexed Treasury bills used for open market operations by the Central Bank. Controls on external credit would have been impossible without the application of indexing to the exchange rate — in small steps at frequent but unpredictable intervals. These adjustments eliminated speculative inflows and outflows of capital, while at the same time stimulating long-term lending to Brazil because they gave assurance that the balance of payments would remain viable.

With respect to economic growth, an essential part of the success story has been increasing confidence and cooperation between the government and the private sector. Institution-building has already been mentioned in connection with the successful growth performance. So is the improvement of the tax and expenditure control systems. Important changes in tax laws have gone far beyond the introduction of indexing — important as this has been to prevent the destruction by inflation of the incentive to save, indeed, of the very possibility of saving. They include a far-reaching system of tax incentives designed to stimulate saving by stimulating investment in marketable securities and other financial instruments, as well as tax incentives (including tariff exemptions) designed to promote investment in real assets in certain sectors and regions of the country. Also important has been the development of labor law, which gave workers the choice between: (1) certain indemnities in case of unjust dismissal, and (2) participation in a noncontributory fund (distinct from that established under the Social Integration Program) which they would receive upon retirement, disability, or unemployment or could withdraw for specified purposes such as the purchase or construction of a house. The second option, which tends to enhance labor mobility and productivity, was adopted by an overwhelming proportion of workers.

Some general reflections on indexing. In many countries the adoption of widespread indexing, though an important change in the economic system, would require no change in the law. In others it would merely require reestablishing freedom of contract or changing the manner in which this freedom is restricted. The most complicated changes would probably be those which would have to be made in the tax laws and in the laws governing public sector activities in general. The Brazilian experience shows that it would be naive to believe that a generalized system of indexing can be installed and then left to its own devices, that is, that rules can take over from authorities in this respect. Indexing means that certain magnitudes are indexed on others, and this implies either lags or a reliance on estimates rather than past events. Both lags and estimates can result in highly bothersome and misleading signals. Aside from the possibility of price repression, there is a possibility that in the attempt to avoid false signals the formula by which past events affect the magnitudes to be indexed will be changed, or that estimates will be made to

avoid what seemed to be false signals. Nevertheless, the adoption under appropriate conditions of a generalized system of indexing, even where it is not in retrospect revealed to have been perfect or automatic at all times, will certainly be found to have prevented major distortions which would otherwise arise under inflation.

Indexing is a way of living with inflation which makes inflation less harmful than it would otherwise be. But price stability is still better than inflation — even indexed inflation, which may, on balance, delay progress in reducing the rate of inflation. Whether the advantages of indexing outweigh the disadvantages depends particularly on the strength of the underlying factors which keep inflation going and the state of expectations.

One important aspect of indexing should be obvious. Just as the absence of indexing under inflation may lead to distortions, so may partial indexing — and the distortions caused by partial indexing may even be the worse of the two kinds. Like partial indexing, the indexing of competing items on quite divergent indices can cause distortions, unless these are prevented by offsetting incentives and disincentives of other kinds.

A somewhat similar problem arises where relatively long-term loans (like mortgages) have been financed by financial institutions on the basis of unindexed, relatively short-term borrowings (like savings deposits). This latter problem means that a country which, unlike Brazil, had a considerable volume of such loans and deposits before the introduction of indexing would be facing a very difficult problem on introducing indexing. The problem is not insoluble, however, and is in principle no different from the problem which arises when nominal interest rates rise for prolonged periods.

It should be clear from the Brazilian experience that indexing by itself is not a way either to combat inflation or to stimulate growth. It was certainly never seen in Brazil as a policy which could be used by itself, permitting policy makers to dispense with vigorous anti-inflation and growth measures.

[Extracted from Essays on Inflation and Indexation, Washington, D. C.: The American Enterprise Institute for Public Policy Research, 1974, pp. 87-98. Copyright© by the American Enterprise Institute for Public Policy Research.]

Indonesia: Economic Stabilization, 1966-69

Gunnar Tomasson

[Indonesia, which experienced extremely high rates of price increase in the early and mid-1960s, decided not to live with its inflation. The unusually successful results of its 1966-69 stabilization program, and the methods used, are described.]

The Indonesian economy suffered from rapid inflation during the first half of the 1960s, culminating in an increase of over 1,500 percent in the Djakarta price index during the 12-month period ending June 1966. Mismanagement and inflation severely disrupted the economy and this in turn accentuated the inflationary impact of continuing monetary expansion. [For a description of conditions in Indonesia during the time of rapid inflation, see Development Digest January 1969, pp. 111-17.] At the time of the political upheaval late in 1965, it was clear that unless a major effort were made to restore relative price stability, the country was faced by complete economic collapse. Accordingly, in October 1966, as soon as the new government had consolidated its position, it launched an economic stabilization program.

Inflation is essentially an economic problem, the solution of which requires appropriate economic measures. A successful stabilization program, therefore, requires that political conditions permit the design and execution of policies that are internally consistent and coordinated. During the stabilization period, a group of high-ranking government economists who enjoyed the unqualified support of the Indonesian

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government were responsible for formulating economic policy. In view of the difficult, and often unpopular, policy decisions that were required, this political solidarity was essential. Also important was the support in the form of economic aid and technical assistance given by the international community to Indonesia throughout the stabilization period. Substantial amounts of foreign aid were provided by a group of western countries and Japan, coordinated in the Intergovernmental Group for Indonesia, who met regularly with representatives of the Indonesian government and of the IMF and World Bank to review the progress of the stabilization program and to consider the need for additional aid. Agreements were also made between Indonesia and its creditor countries, rescheduling the heavy debt obligations that were outstanding at the beginning of the stabilization period.

At the outset, most observers believed that the restoration of price stability would take a number of years. However, the actual progress of the stabilization program belied this initial skepticism; from 639 percent in 1966, the increase in the Djakarta consumer price index decelerated to 113 percent and 85 percent in 1967 and 1968, respectively, and to 10 percent in 1969. This remarkable achievement, which has few if any parallels in recent years, reflects the determined implementation of comprehensive economic policies over a three-year period. Although specific circumstances may differ in other economies, the success of the Indonesian stabilization program may provide valuable guidance on how rapid inflation can be controlled.

The Stabilization Program

The stabilization program was aimed not only at restoring relative price stability as an essential prerequisite for orderly long-term economic growth and development but at achieving this aim quickly. The Indonesian authorities recognized that an effective program would impose hardship on the general public as economic resources were directed away from current consumption to productive uses, and they were especially concerned, therefore, that the period of hardship should be brief. This concern was reflected in the fiscal and monetary policies adopted by the Government, which sought to curtail less essential budget expenditures and to eliminate the large operational losses of many public sector enterprises, while providing bank credit for agricultural, industrial, and essential distribution activities. A major effort was made to increase current budget revenues, which had declined sharply in real value during the early 1960s, in order to balance the current budget and later to provide funds for financing the development budget. The emphasis on economic growth and development was also reflected in the activation in 1966 of the National Planning Board for coordinating development activities and for preparing a long-term development plan.

On the external side, Indonesia had accumulated large foreign debts during the inflationary period, while its export earnings had declined because of economic dislocations. It was very important, therefore, for the success of the stabilization program that Indonesia was able to reschedule most of the foreign debt maturities that were due during the stabilization period and to obtain substantial amounts of new foreign aid. In addition to relieving the balance of payments pressure by providing foreign exchange resources for financing essential imports, the foreign aid program generated counterpart funds that were a major factor in the noninflationary financing of the budget deficit throughout the stabilization period.

These specific economic measures, important as they were, represented only a part of the attack on inflation. Equally important was the basic change away from a government-directed economy toward a system in which market forces played a predominant role. This change was evidenced by ensuring that public utility prices and other administered prices rose to economic levels, and by the decision to introduce an exchange system virtually free of restrictions on payments, with flexible exchange rates for most transactions. Although the public sector retained a predominant role in the economy, much greater scope was given to the private sector, and direct foreign investment was encouraged.

Fiscal policy. The government budget deficit had been the principal factor in the past inflation, reflecting a serious deterioration in tax administration and a large increase in current expenditures. Between 1960 and 1966 the ratio of budget receipts to national income is estimated to have declined from about 10 percent to about 4 percent, and the current account deficit in 1966 amounted to over 90 percent of current receipts. The Government's economic program, therefore, gave high priority to a major improvement in the fiscal field, including the early elimination of bank financing of the budget deficit. Current budget expenditures, including wages and salaries of government employees, were maintained at an austerity level throughout the stabilization period, and a concerted effort was made to increase current budget receipts through improved fiscal administration. As a result of these measures, the current budget deficit was reduced to 20 percent of current receipts in 1967, while the over-all deficit was only about 5 percent of total budget receipts because of aid counterpart receipts in excess of development expenditures. In 1968 both the current budget and the over-all budget were balanced, and in 1969 there was a sizable surplus on the current budget while the over-all budget remained in balance. By the end of the stabilization period, it was estimated that domestic budget revenues had been increased to about 8 percent of national income.

The achievement in the fiscal field reflected the determination of the authorities to limit budget expenditures to available budget resources. In a country ravaged by inflation, this policy of course involved the postponement of many urgent expenditures, especially for maintenance of public facilities and for adequate government salaries. To ease the implementation of fiscal policy in a rapidly changing economic situation, procedures for quarterly budget programming were introduced early in the stabilization period. Thereafter, quarterly expenditure programs were prepared regularly on the basis of projected receipts, and with allowance for seasonal variations in both budget expenditures and receipts. Once the quarterly program had been approved, expenditure authorizations were limited strictly to the program amount, unless budget receipts exceeded the original estimate in which case authorizations were usually increased by an equal amount. On the other hand, if there was a shortfall in actual receipts, the expenditure program for the following quarter was adjusted accordingly.

On the receipt side, emphasis was placed on increasing customs duty collections, direct tax revenues, and proceeds from excises and sales taxes. At the customs, the average effective tariff rate on imports was increased substantially by the use of a realistic accounting rate for determining the local currency value of imports on which the duty was levied. A sales tax on imports was introduced, and close attention was paid to improving customs administration and to reducing underinvoicing of imports and other irregularities. This effort resulted in a sharp increase in proceeds from import levies, which rose by about 115 percent in real terms between 1967 and 1969/70, while total imports increased by only 60 percent, including a relatively larger share of low-duty or duty-free imports. Equally impressive increases were recorded in revenue from the domestic sales tax and general excises, owing to improved administration and increased economic activity, and in income tax collections, especially from oil companies.

The most striking increase, however, was in excise and sales taxes on petroleum products, which rose more than sixfold in real terms between 1967 and 1969/70, from 2.6 percent of current receipts to 7.5 percent. Before 1966 petroleum products, including kerosene for household use, had been sold at a small fraction of production cost. Soon after the introduction of the stabilization program, and at intervals thereafter, the prices of all petroleum products were raised in order to eliminate the huge implicit consumer subsidies and to generate budget revenue. These and similar adjustments in public utility prices had a very sharp impact on the cost of living and were, therefore, among the most difficult and courageous decisions taken by the authorities during the stabilization period. However, they are a clear example of the basic change in fiscal policy that was an integral part of the stabilization program.

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The most striking increase, however, was in excise and sales taxes on petroleum products, which rose more than sixfold in real terms between 1967 and 1969/70, from 2.6 percent of current receipts to 7.5 percent. Before 1966 petroleum products, including kerosene for household use, had been sold at a small fraction of production cost. Soon after the introduction of the stabilization program, and at intervals thereafter, the prices of all petroleum products were raised in order to eliminate the huge implicit consumer subsidies and to generate budget revenue. These and similar adjustments in public utility prices had a very sharp impact on the cost of living and were, therefore, among the most difficult and courageous decisions taken by the authorities during the stabilization period. However, they are a clear example of the basic change in fiscal policy that was an integral part of the stabilization program.

As noted before, the counterpart of foreign commodity aid was an important source of budget receipts during the stabilization period. The Indonesian Government, however, attached great importance to financing all current expenditures from current receipts while assigning aid counterpart funds to development. This objective was not fully realized in 1967, but beginning with the 1968 budget all counterpart proceeds were used exclusively for financing development expenditures. By 1969/70, the first year of the Government's Five-Year Development Plan, the current budget position had improved sufficiently to generate a surplus equal to about 30 percent of development budget outlays, excluding foreign project aid disbursements.

Monetary policy. The rate of monetary expansion during the stabilization period, although still rapid, decelerated sharply. Money supply, which increased by 760 percent in 1966, rose by about 130 percent and 120 percent in 1967 and 1968, respectively. Even in 1969, when relative price stability was largely restored, money supply increased by as much as 60 percent, reflecting a return to a more normal level of real liquidity in the economy. Most of the increase in money supply reflected nongovernment bank credit, which increased by 388 percent in 1967 and further by 306 percent and 85 percent in 1968 and 1969, respectively. The process of stabilization, therefore, could tolerate a high rate of monetary expansion as long as new credit was directed primarily to essential economic activities, rather than to financing current budget deficits or the losses of public utilities, and provided that the balance of payments impact of the expansion could be met by available foreign exchange resources including foreign aid. Central bank credit represented the major part of the monetary expansion, especially during the first two years of the stabilization program, as the authorities sought to eliminate the physical shortages of essential consumer and production goods, which were a major factor in the inflationary spiral. This primary credit expansion was essential to the Government's objective of restoring price stability while expanding over-all domestic production, because the level of real liquidity in the economy had been reduced by about 60 percent during 1960-66, and the capital resources of both business enterprises and the commercial banking system had been largely depleted by the inflation.

Inflation in Indonesia was due not simply to excessive monetary expansion but also to a serious breakdown of public confidence in the currency and the emergence of critical supply bottlenecks and the disruption of production. The importance of nonmonetary factors was vividly demonstrated by developments late in 1967 and early in 1968, when a rice shortage coincided with speculative demand for foreign exchange which could not be met from official reserves. As a result, the price of rice increased by about 100 percent in one month alone, the free market foreign exchange rate depreciated by 42 percent in three months, and the general price level rose by 82 percent from October 1967 to

February 1968. Subsequently, despite an increase of 57 percent in money supply, the Djakarta price index rose by only 11 percent during the six-month period after March 1968, when supplies of food and foreign exchange became more adequate. The periodic sharp adjustments in public utility prices and in the prices of oil products, although important as a part of the stabilization program, also tended to have an inflationary impact on the economy. However, after relative price stability and confidence in the currency had been restored, an increase of from 50 percent to 150 percent in the prices of important oil products in January 1970 had little noticeable effect on other prices.

Interest rate policy. Interest rate policy was largely passive during the first two years of the stabilization period, and real interest rates on bank borrowing were generally negative, except in the relatively small private banking sector. No attempt was made to generate private savings deposits while the rate of inflation remained very high. In October 1968, however, amidst increasing indications that inflation was being contained, a savings deposit scheme was introduced. Under the scheme, state commercial banks paid an interest rate of 6 percent a month for 12-month deposits and somewhat lower rates for 3-month and 6-month deposits. Although the level of interest rates was lowered in March 1969, the central bank had to subsidize the interest cost to the commercial banks, which until May 1969 exceeded the average rate of interest earned on their loans.

The savings deposit scheme proved very successful. After a sharp speculative attack in the foreign exchange market late in 1968 had resulted in a heavy loss for the speculators, and with increasing domestic price stability, time deposits rose by 175 percent during January-April 1969, increasing from about 11 percent to about 25 percent of money supply. In retrospect, these developments marked an important turning point in the stabilization effort; the foreign exchange speculation was the last of several encountered during the stabilization period, and the increase in time deposits marked the restoration of confidence in the currency and the beginning of a rapid reconstitution of the economy's real liquid holdings.

Credit policy was unquestionably one of the critical factors in the Indonesian stabilization program. As already indicated, its basic premise was that extension of credit to existing production units for financing rehabilitation and working capital requirements would facilitate the fight against inflation through its impact on production for the domestic market and for export. Therefore, for the first two and a half years of the stabilization period, most bank credit was extended for short-term current financing rather than for medium-term investment financing. However, a limited amount of investment

funds was provided through the Government's development budget and through the disbursement of foreign project aid. With the return of relative price stability, a medium-term investment credit program was introduced in April 1969, financed primarily by the central bank and by budget funds. Although comprehensive statistics are not available, import and export data as well as other indicators strongly suggest that the stabilization period was marked by a substantial increase in economic activity.

The Indonesian case, therefore, clearly contradicts the popular belief that stabilization needs to entail economic stagnation or recession. Provided that available resources are allocated primarily on the basis of economic criteria, stabilization can indeed proceed simultaneously with economic growth.

Balance of payments policy. The policies adopted by the Indonesian Government in the external sector were the third major component of the stabilization program. During the first half of the 1960s, the foreign exchange system itself had become an important distorting factor in the economy as the authorities sought to cope with continued pressure on the balance of payments by introducing a vastly complicated system of exchange allocation and multiple exchange rates — which, in the absence of effective measures to deal with the underlying monetary causes of the imbalance, was quite ineffective. By 1966 export production was declining, partly because of heavy taxes on export proceeds; there were critical shortages of imported raw materials and spare parts in most sectors of the economy; and additional foreign assistance was increasingly difficult to obtain. Moreover, new foreign investment had practically ceased following the "take-over" of most foreign-owned enterprises in 1964 and 1965. Since, in addition, repayments of past debts were falling due, Indonesia faced external insolvency.

One of the first tasks of the new Indonesian Government was accordingly to negotiate debt relief agreements with its creditors. Agreement was reached in 1967 with the major western creditors and Japan on the rescheduling of debt maturities falling due each year. Separate agreements were negotiated with Indonesia's East European creditors. As a result of these agreements the otherwise heavy burden of debt repayment was lifted from the balance of payments during the stabilization period.

In addition, substantial amounts of new foreign aid were provided by a number of western creditor countries and Japan, which joined in a consultative group under the chairmanship of the Dutch Government to consider Indonesia's annual aid requirements. Throughout the stabilization period a large part of the aid was used to finance imports of

essential consumer goods and raw materials, but as time passed an increasing share was earmarked for financing development projects. The local currency counterpart of the nonproject aid was also the chief means of financing Indonesia's development budget. The importance of nonproject aid for the balance of payments is reflected in import statistics: excluding project imports and imports for the oil sector, total imports increased by 25 percent in 1967 and further by 11 percent in both 1968 and 1969, while the share financed by aid increased from 23 percent in 1966 to 34 percent in 1968. In 1969 the ratio declined to 30 percent.

Indonesia's own foreign exchange earnings also increased substantially during the stabilization period from \$714 million in 1966 to \$975 million in 1969; during the three years 1967-69 oil exports rose by 67 percent, to \$358 million, and other exports by 24 percent, to \$617 million. Export promotion was an important aspect of the new Government's policy, as shown by the decrease in official exchange "taxes" on exports from as much as 50 percent at the end of 1966 to less than 15 percent at the end of 1969.

In determining their long-term strategy for economic growth, the Indonesian authorities recognized that early development of the country's substantial and varied natural resources would require a large inflow of foreign capital and technical skills. In line with their basic policy of developing an open economy, they decided to encourage private foreign capital investment and to return foreign properties that had been taken over by the state to their former owners. A special foreign investment board was established to negotiate agreements with individual foreign investors, and work was started on a complete revision of Indonesian company and taxation laws to adapt them to prevailing international standards. In addition to approved projects in the oil sector in which there was great interest by foreign investor, foreign investment proposals involving potential capital outlay of over \$1.0 billion had been approved by the end of 1969. The largest part, \$463 million, represents investment in the mining industry, and an additional \$353 million investment in the forestry sector.

Foreign exchange transactions during the stabilization period were conducted mainly in two markets, called the BE (Bonus Export) market and the DP (Complementary Foreign Exchange) market, each of which had a flexible market-determined rate. The BE market was by far the more important of the two and included the major part of exports and imports, government transactions, approved foreign investments, and certain invisibles. Exporters of non-oil commodities were permitted to sell a certain part of their export proceeds in the DP market, where the exchange rate tended to be about 15 percent more depreciated than the BE rate due to limits on the uses of BE

exchange. DP funds could be used freely for less essential imports, miscellaneous capital flows, and non-trade invisibles.

In the foreign exchange field the abolition of the old system of payment restrictions and direct allocation of exchange was a major element in the stabilization program, as was the establishment of a system of flexible exchange rates. These changes, which were introduced at the beginning of the stabilization period in October 1966, ensured that the foreign exchange resources of the economy would be allocated on the basis of market demand and supply and at a price set by the market itself, rather than through arbitrary administrative decisions. The authorities recognized, of course, that the foreign exchange rate is an important factor in any inflationary spiral, and that depreciation of the rate would have a multiplier impact on the general domestic price level. However, in their exchange rate policy, as in their decision not to restrict capital movements through the secondary exchange market, the authorities chose not to address themselves to the symptoms of inflation and external imbalance but to attack the underlying causes. Apart from the greatly improved allocation of foreign exchange resources under the new system, complemented, of course, by the Government's credit and fiscal policies, the freedom of transactions itself was an important psychological factor in the restoration of confidence and reflected the Government's own confidence in the ultimate success of its stabilization effort.

The Indonesian Government moved consistently between 1966 and 1969 toward a unified foreign exchange system. Unification, however, was not considered desirable until confidence in the domestic currency had been restored, because of the possibility of permitting speculative outflow of funds at a more depreciated rate through the DP market without having to adjust the principal exchange rate itself. The two exchange rates fluctuated freely during the first half of the stabilization period. However, by May 1968 the disequilibrium in the domestic economy had been substantially reduced and the prospects for an early restoration of relative price stability appeared favorable. Therefore, a new policy was introduced for exchange rate management in the BE market, whereby short-term fluctuations in the rate were eliminated. The authorities continued, nevertheless, to permit the BE rate to move according to basic market conditions. At the end of October 1968, a similar policy was adopted with respect to the DP market, and after March 1969 the two rates were kept stable, with the DP rate 15 percent below the BE rate. This stability prepared the ground for the unification of the exchange rates in April 1970.

The introduction of a major exchange reform on April 17, 1970 may be regarded as marking the end of the stabilization period. Under the reform, the BE and the DP markets were unified at the DP rate of Rp 378 = US\$1. With the exception of aid program funds for commodity

imports and related services, which continue to be sold at the previous BE rate of Rp326, all trade, capital, and invisible transactions are effected without restrictions at the unified rate of Rp 378. [devalued to Rp 415 in 1972]. This reform culminated the efforts of the Indonesian Government throughout the stabilization period to improve the efficiency of the foreign exchange system and to rely on monetary, fiscal, and trade policies to attain their balance of payments objectives.

Conclusion. Considering the severity of the inflationary problem, the success of the Indonesian stabilization program was a remarkable achievement. Although circumstances will differ in other countries faced with rapid inflation, the basic approach of the Indonesian program represents a promising model of anti-inflationary policies. The principal factor in the Indonesian case was the clear recognition from the outset that a stabilization program could not succeed if it did not attack directly the underlying causes of excessive monetary expansion, i. e., the budget deficit and other public sector deficits. The second important factor was the implementation of a selective credit program, which directed new bank credit to economic activities that were essential for the elimination of supply bottlenecks and for the reactivation of existing production facilities, rather than for financing new investment. A third major component was the dismantling of the previous, complex foreign exchange system and the maintenance throughout the stabilization period of a liberal trade and payments system in which the exchange rates were permitted to move according to underlying demand and supply conditions.

The stabilization program did not proceed without encountering temporary difficulties and setbacks, some of which had not been foreseen at the beginning of the period. In meeting each of these, however, the Indonesian authorities consistently sought to apply corrective measures that were consistent with the basic strategy of the stabilization program, rather than to deviate even temporarily from that strategy. This consistency was an important factor in restoring public confidence in the Government's economic policies and, therefore, was essential for the success of the stabilization program.

[Extracted from Finance and Development, Washington, D. C.: International Monetary Fund and World Bank Group, Vol. 7, No. 4, December 1970, pp. 46-53.]

Note: The extraordinary reduction in the rate of inflation to 10 percent a year in 1969 was maintained for two more years: annual increases in the cost of living were only 9 percent in 1970 and 3 percent in 1971. In the next two years, however, some slippage took place, and an annual increase of 26 percent occurred in 1972 followed by 27 percent in 1973. This upward movement continued into the first quarter of 1974; but in the second and third quarters of 1974 the rate of price change has reportedly been brought close to previous lower levels.



TOURIST RESORT IN TRINIDAD
(PHOTO: PAN AMERICAN AIRLINE INC.)

International Tourism and the Developing Countries

UNCTAD Secretariat

[This article indicates the growth of world tourism, the share of developing countries in its growth, and the relative importance of tourism in foreign exchange earnings of a number of countries.]

According to data published by the International Union of Official Travel Organizations (IUOTO), the volume of world tourism, as measured by the aggregate number of arrivals of tourists, rose by about 10 percent annually between 1958 and 1970, and the growth in world receipts from international tourism was similar (see table 1). For the period 1958-1970, receipts

Table 1: Growth of International Tourism and World Exports 1958-1969

Year	International tourist arrivals		International tourist receipts		World (merchandise) exports	
	Number (millions)	Increase over previous year (%)	(\$ billion)	Increase over previous year (%)	(\$ billion)	Increase over previous year (%)
1968	55.3	--	5.4	--	108.1	--
1959	63.0	13.9	5.8	7.3	115.7	7.0
1960	71.2	13.0	6.8	17.0	128.0	10.6
1961	75.3	5.8	7.3	7.3	134.0	4.7
1962	81.4	8.1	7.8	6.8	141.4	5.5
1963	93.0	14.3	8.3	6.4	154.1	9.0
1964	108.0	16.2	9.6	15.7	172.4	11.9
1965	115.5	6.9	11.0	14.6	186.4	8.1
1966	130.8	13.2	12.5	13.6	203.6	9.2
1967	139.5	6.6	13.4	7.2	214.6	5.4
1968	139.7	0.1	13.8	3.0	239.6	11.6
1969	154.9	9.4	15.5	12.3	273.2	14.0
1970 ^a	168.0	8.4	17.4	11.2	312.4	14.3

Sources: IUOTO, *Economic Review of World Tourism*, 1972 Edition (Geneva, 1972); *Handbook of International Trade and Development Statistics* (United Nations publication, Sales No. EF. 69, II. D. 15); United Nations, *Monthly Bulletin of Statistics*, vol. XXV, No. 7, July 1971.

a. Figures for 1970 are provisional.

UNCTAD: The United Nations Conference on Trade And Development, Geneva.

from international tourism grew somewhat faster than world (merchandise) exports, the rates being respectively 10.2 percent and 9.3 percent annually.

The expansion of tourism has not benefited all regions to the same extent. As can be seen from table 2, the share of the developing countries as a whole in world receipts from tourism has generally been less than 20 percent, without any very marked upward tendency. Still, this figure compares favorably with the share of developing countries in world exports (excluding petroleum) which has been declining continuously, from 15.4 percent in 1960 to 12.2 percent in 1968. However, international tourism has tended to concentrate on relatively few countries of the developing world. In 1968, for example, Mexico accounted for more than 40 percent of the total receipts from tourism of developing countries, and together with 15 other countries accounted for about 80 percent of the total.

Table 2. International Tourism and World Exports, 1960-1968:
Share of Developing Countries (Percentages)

	Share in world total					Annual Increase 1960-1968
	1960	1965	1966	1967	1968	
Tourist arrivals	7.2	9.0	9.0	7.5	8.0	10.4
Tourist receipts	17.6	18.4	18.5	15.6	20.0	11.1
Exports ^a	15.4	13.5	13.2	12.6	12.2	7.6

Sources: IUOTO, International Travel Statistics (various issues) and Technical Bulletin BT/TS/1/69, February 1969; UNCTAD, Handbook of International Trade and Development Statistics 1969 and Supplement 1970.

a. Excluding petroleum exports.

In recent years, there has been a rapid development of tourism in some developing countries which earlier had virtually no tourist appeal. Contributory factors have been improvements in international transport and determined efforts by the governments of these countries in the fields of planning and promotion. As a consequence, these countries have considerably expanded their earnings from this source and in some, such as Kenya and Tunisia, tourism has become a leading export sector, with expectations of continued relatively fast growth. In other developing countries, in spite of its growing importance, tourism provides only a relatively small proportion of total foreign exchange receipts on current account. The principal socio-economic factors

determining the growth of international travel are well known. Some are largely beyond the control of a receiving country. Such factors include the rise in real income in the developed countries, the relatively high income elasticity of travel expenditure, longer and more frequent paid holidays, and the spread of education, which stimulates greater interest in foreign places and cultures. The available evidence suggests that in developed countries expenditure on travel abroad increases more than proportionately with a rise in income.

Table 3: Foreign Exchange Receipts from Tourism as a Percentage of Total Receipts

<u>Industrial countries</u>	<u>1961</u>	<u>1964</u>	<u>1968</u>
Austria	16.4	22.6	22.4
Ireland	14.8	15.7	13.6
Switzerland	--	14.1	11.6
Italy	11.1	11.0	9.5
France	7.1	7.4	5.7
United States	2.9	3.1	3.3
Federal Republic of Germany	3.2	3.2	2.9
United Kingdom	2.7	2.6	2.7
<u>Southern Europe</u>			
Spain	24.9	35.9	30.9
Malta	2.9	4.0	12.7
Portugal	4.9	11.8	12.5
Greece	10.4	11.3	10.1
Cyprus	6.1	2.2	7.3
Turkey	1.2	1.3	2.8
<u>Developing countries</u>			
Mexico	38.1	38.4	45.5
Barbados	--	21.0	25.3
Jamaica	13.9	12.1	21.0
Tunisia	1.5	5.5	13.9
Morocco	4.5	9.4	12.0
Kenya	--	6.2	9.9
Yugoslavia	2.5	5.5	9.3
Israel	3.9	5.4	6.0
Uganda	--	--	5.5
Jordan	9.3	13.1	5.0
Thailand	1.4	1.6	5.0
Trinidad and Tobago	--	2.3	3.8
Philippines	0.6	1.4	3.7
Singapore	--	1.8	3.0
Tanzania	--	2.6	3.0
Iran	0.7	1.2	2.0
Cambodia	0.5	0.4	1.7
Zambia	--	0.6	0.9
Pakistan	0.2	0.2	0.6
Ceylon	0.4	0.3	0.5
India	1.7	1.5	0.3

Source: IMF

From an examination of data for 12 developed countries which account for the great bulk of international travel, it appears that an increase in national income is accompanied by a rise in expenditure on foreign travel about one-and-a-half times as great (an income elasticity of 1.5), in some countries nearly twice as great. Other factors which influence the nature and geographical pattern of travel as well as its volume include improvements in air transport which encourage travel to more distant destinations, and the constant expansion of travel by motor coach and by private car.

Travel agents and other intermediaries, such as tour operators, exert an important influence on the pattern of international holiday travel. There are two aspects to be considered in this connection. First, the host countries depend very much for their clientele on the intermediaries in the countries of residence of visitors; these intermediaries operate on a large and growing scale, and have strong international connections. By reason of their position, they are able to secure favorable terms from hotels, transport and other tourist enterprises in the host countries. Second, by offering very attractive (especially all-in) rates for travel to and vacations in particular countries, they have an important influence on the individual tourist's choice of destination.

[Extracted from Elements of Tourism Policy in Developing Countries, Report by the UNCTAD Secretariat, New York, 1973, pp. 5-9. U.N. Sales No. E. 73. II, D3.]

Tourism: Blessing or Blight?

George Young

[The case for promotion of tourism as a source of national economic growth is a strong one. However, there are a number of negative aspects less widely recognized than the positive ones which must also be considered. Where these negative aspects are important, governments should make careful plans for the tourist growth they can accommodate and, in some cases, may wish to envisage limitations and stricter controls.]

Reasons for Tourist Promotion

There are powerful arguments why a country should promote its tourist industry. Firstly, tourism is a source of foreign exchange. Few countries have escaped balance of payments' problems in the past decade. Any industry which generates foreign exchange is likely to receive fiscal incentives and moral support from the government, probably at the expense of other industries which have a high import content or which do not export. Further, the foreign exchange earned by tourism is obtained conveniently; the customer brings himself to the point of sale at his own expense, and takes immediate delivery of the services.

The foreign exchange motive is particularly noticeable in Eastern European countries, where it is difficult to earn hard currencies. A painstaking analysis by Soviet statisticians has revealed that the average profit from one tourist is equal to the export of nine tons of coal, fifteen tons of oil, or two tons of grain. Further, if Lake Baikal were exploited as a tourist center, it would earn twice as much hard currency as

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the total export of oil from USSR — without depleting its stock of raw materials.

Secondly, tourism is a growth industry — and growing faster than most other export industries. Any government which is minded to assist its export industries would be well advised to select those industries whose products are going to be increasingly in demand. As personal incomes rise in the richer countries, a higher percentage of that income is spent on holidays and travel; the demand for tourism is highly elastic. Faced with the choice of assisting export of food, clothing, raw materials or tourism, a government would be well advised to choose tourism, as expenditure on tourism is going to increase faster than expenditure on the other commodities.

Thirdly, tourism may be an industry where a country has an in-built competitive advantage over other countries, or even, as with some types of tourism, a complete monopoly. A country which is endowed with reserves of oil, gold or diamonds would naturally concentrate its industrial and export activity on these industries. Historic monuments, pleasant scenery, good beaches, sun or snow can be as valuable to a country as more tangible resources such as oilwells and goldmines; and perhaps more valuable as they are less exhaustible. Countries with a competitive advantage in such tourist resources should exploit them for the same reasons they should exploit any other natural resource.

Fourthly, development of the tourist industry may promote a better image of that country in the eyes of the world and thereby enable it to achieve other objectives. Eastern European countries see tourism to their countries as a means of breaking down seemingly unjustified prejudice against their way of life. The rightwing regimes in Spain and Greece would probably have received harsher treatment from more liberal European governments were they not such popular tourist destinations.

Fifthly, turning to internal considerations, tourism is a source of employment. Tourism is a labor-intensive industry which can offer employment to the semi-skilled and unskilled. In countries or areas where there is high unemployment, tourism can provide moderately quick relief. Even in areas with low unemployment, it can raise activity rates by generating employment for those who would otherwise not work at all, such as the retired, or married women seeking part-time employment. Because of labor intensity, the capital required for job creation is relatively low; and foreign capital may be more easily attracted to tourist investments than to those in many other activities. Tourism can thus promote national prosperity as well as international liquidity.

Evidence is available that the tourist industry does have significant advantages over manufacturing and agricultural industry in assisting growth in the less developed countries. For Kenya, F. Mitchell estimates: \$65 million investment in tourism will increase GDP by \$53 million, an increase in capital stock rather less than the increase necessary to secure the same increase in GDP in manufacture, and about the same necessary in agriculture. It is possible that investment in tourist infrastructure may be of little benefit to the residents of less developed countries when they are not intensive users of hotels or airports, or of the roads that are built to connect with tourist destinations. Nevertheless, where there is high unemployment, a relatively unskilled labor-force and few alternative sources of employment — as for example in Mauritius — then stimulation of the tourist industry may well be a correct course of action.

Finally, related to the above, tourism can be the instrument of a regional policy aimed at achieving an equitable balance between major industrial areas and the rest of a country. Many areas are simply not suited to industrial development and are in danger of being by-passed by an industrial society; tourism enables the wealth earned in one part of the country to be transferred in part to another. Viewed from the position of world government, this argument is equally valid. It is a method of transferring wealth from the richer countries to the poorer ones and securing a more equitable distribution of resources — nearly half the West German trade surplus in 1971 was extinguished by the deficit on foreign travel.

For these reasons, the tourist industry throughout the world is heavily subsidized by national governments. Table 1 shows which OECD countries give which type of financial assistance; it is published by the OECD tourist committee and needs to be interpreted with care. For example, it shows that in 1969 both Austria and the United Kingdom gave fiscal incentives to their tourist industries. As far as Austria was concerned, the incentive was the very valuable one of 80 percent exemption from turnover tax for the whole of the accommodation industry. As far as the U.K. was concerned, the only incentive was the entitlement to a refund of Selective Employment Tax by a very small number of hotels in certain rural parts of development areas. Other incentives vary from country to country; in Yugoslavia, the salaries paid to hotel staff are exempt from federal income tax. In Portugal, hotels are exempt from property and industrial tax for ten years. In Japan, travel agents are exempt from income tax on revenue earned by selling inclusive tours to Japan to foreigners.

Because government incentives to tourism are changing so fast, it is difficult to say which country gives its tourist industry the most favorable treatment; it must however be difficult to imagine more

Table 1: Government Aid to the Tourist Industry, 1969

	<u>Loans</u>	<u>Guarantee of Loans</u>	<u>Subsidies</u> ^{a/}	<u>Tax Incentives</u>
Austria	X	X	X	X
Belgium	X	X	X	X
Canada		X		
Denmark				
Finland		X	X	X
France	X		X	X
W. Germany	X	X	X	
Greece	X	n. a.	n. a.	X
Iceland	X			
Ireland		X	X	X
Italy	X		X	X
Japan	X			X
Luxembourg	X	X	X	
Netherlands	X	X	X	n. a.
Norway	X	X		
Portugal	X	X	X	X
Spain	X	n. a.		
Sweden	X	X	X	
Switzerland	X	X		
Turkey	X			X
United Kingdom	X		X	X
United States				
Yugoslavia	X	n. a.	n. a.	X

X indicates existence of aid indicated.

n. a. : information not available.

^{a/} Subsidies include those affecting interest rates.

Source: Tourism in OECD Member Countries, Paris, OECD, 1971,
p. 142.

favorable proposals than the investment incentives granted to foreign hotel developers by the Tunisian Government. There is a five-year exemption from corporation tax on profits, with the right to carry forward any loss to subsequent years. There is an exemption from rates; access roads are constructed at the government's expense and the public utilities are brought to the site free of charge. The government acts as guarantor of any bank loan to build the hotel, up to half its total cost; and most of the balance can be borrowed from semi-government institutions at favorable interest rates. The developer can repatriate his capital and his profits whenever he wishes, and the government guarantees not to increase any taxes for twenty-five years. The convertibility of the currency is underwritten by the government, which also promises not to nationalize or confiscate the hotel.

Disadvantages of Subsidy

Financial assistance has been justified on the basis of the six reasons put forward earlier. There are three main arguments against such assistance; one, which will be expanded below, is that the disadvantages of a growing tourist industry may outweigh the advantages; the second is that it is regressive. It is worth pointing out that these large sums of money to assist the tourist industry are not only given at the expense of other industries, but that they come out of the resident taxpayer's pocket. They therefore constitute a subsidy from the resident taxpayer to the visiting tourist whose costs of visiting are reduced. This is an inequitable transaction since the visiting tourist tends to have an above-average income already and the residents of the principal tourist receiving countries tend to have below average incomes. The third reason for not giving financial assistance is that it is not the most important or effective means of encouraging the tourist industry anyway. This point is well made by the U.K. Foreign and Commonwealth Office in a booklet for the benefit of its economic planning staff:

"In general, investment incentives would appear to be of only marginal influence in attracting development companies... Since a considerable part of the overall pecuniary benefit of tourism comes from tax takings, it is important that they should not be diminished by overgenerous or unnecessary tax holidays. From discussions with various people involved in tourism, it would appear that investment incentives are much less important in attracting investment than are say (a) a positive attitude by the recipient government to tourism development, (b) absence of red tape, (c) governmental provision of adequate infrastructure."

A more fundamental question than whether or not financial assistance is the correct method of helping the tourist industry is whether or not the tourist industry should be helped by national government at all. It is a question which is rarely asked and seldom answered. But in order to balance the formidable list of advantages conventionally adduced to the tourist industry, it is necessary to examine those countries where tourism has, for one reason or another, caused serious problems and to put these on the other side of the balance sheet. Only then is it possible to make an impartial assessment about the treatment which the industry should receive from national government. The disadvantages which have already arisen from the growth of tourism can be divided into four main headings; social, economic, environmental and -- for want of a better expression -- administrative.

The social problems which have often accompanied the growth of tourism are numerous, but the principal ones are as follows: social friction arising from the importation of foreign workers and their families to fill the higher paid jobs in the industry; the confrontation effect which can result from the better-off traveller giving orders to the less well-off local resident; the resentment of residents having to share their services with others; the effect on densities of living in the tourist cities; and the disappearance of local cultures and customs in the face of tourist development.

These social problems are most clearly visible in the Caribbean Islands where tourist development has often been rapid and unplanned and where local economies are limited and the inhabitants few. There, resentment of the tourist has grown so much that guards with guns patrol hotel grounds in Jamaica, and in Puerto Rico Indipendentistas bomb American-owned hotels. In Spain, allegations have been made recently that tourists are responsible for a new wave of colonialism. In November 1971, the Madrid newspaper ABC accused the twenty-five million tourists who visit Spain each year of turning large parts of the country into an "alien land where foreign languages are spoken, foreign currency is accepted and Spaniards discriminated against." The same sort of resentment is visible in Russia, where there are night clubs where only tourists are admitted, and in Romania, where special shops exist where only tourists can buy goods at very favorable rates of exchange.

At the root of this particular aspect of the problem, whatever the country, is the feeling of residents that other people are taking over their country. It is an attack of xenophobia which is very understandable and it could well develop into an infectious epidemic if tourist authorities continue to ignore the symptoms. Behind the hostility towards tourists is the broad question of national identity, about which so little is known. A point might be reached where tourist

destinations would have as much national character as a busy international airport. For example, the Spanish Government's Tourist Development Plan, envisaging 49.5 million tourists in 1980 compared with a resident population of 35 million, must have social repercussions.

In addition to importing tourists, an expanding tourist industry often needs to import foreign workers to take up the new posts. This can give rise to social problems, particularly where the foreign workers so imported are of a different race, color, or creed from the native population. In Bermuda, the government curbed the expansion of the tourist industry because the immigrants needed to staff it were becoming an active and embarrassing political force.

The disruptive effect of tourism on local cultures is one of the saddest effects of the industry. This threat is being recognized; at Fiji's eleventh annual tourism convention the Minister of Tourism attacked "foreign investors who have no conception of local problems and are insensitive to local feelings." Members of that government in Fiji, fully aware that it would be wrong to rely on sugar as the basis of the economy, are openly expressing reservations about diversification into the tourist industry because of the socially disastrous changes it would impose on the Fijian way of life. Culture, after all, is about people and patterns of everyday life -- not monuments and souvenirs.

The economic disadvantages which can arise from an expanding tourist industry can be divided into several sub-headings: inflationary consequences of excessive tourist activity; some unfavorable effects on the balance of payments — in spite of claims to the contrary; the heavy infrastructure costs which are usually a prerequisite of tourist development; the loss of control over the economy where taxes are low or non-existent in order to encourage foreign investment; and the over-dependence of a small economy on one activity which may face an uncertain demand.

The inflationary consequences which tourism can cause arise in several ways. Well-off tourists can cause a general increase in prices in shops which local residents then have to pay; a vigorous hotel building program can cause rises in construction costs, and therefore affect the prices of homes for residents; and land prices can increase through hotel purchase, or through purchase of holiday homes. In Bermuda, due to the absence of a tourist plan, the rapid expansion of tourism was unrelated to the labor supply on the island to service it and this led to galloping wage inflation, as employers engaged in tourist industries outbid each other for a limited pool of labor. The tourist boom stoked up the inflationary fire. Bermuda has frozen new hotel development for five years to relieve some of

the pressures mentioned above, and to give breathing-space to the hard-pressed building industry.

The growth of tourism locally can price out shops providing goods and services for residents and replace them with shops providing more expensive goods and services for tourists. This means that where the former shops remain, they have to pay higher rent and taxes, which are passed on to consumers through higher prices. This effectively means that domestic inflation is being induced by overseas visitors.

Unfavorable effects of tourism on the balance of payments may seem a surprising argument put forward for criticizing growth in tourism. Yet many countries have to import on a large scale to build up the infrastructure for their tourist industries; and many more rely to a large extent on imports to keep it running. Further, due to the changing structure of the tourist industry, much tourist expenditure does not stay in the country very long. Because the necessary economic analysis is all too rarely performed, no one really knows how much net foreign exchange is retained by the tourist industry in most destination countries. However, where calculations have been made, the results are not very encouraging.

An example is Mauritius. Mauritius is acutely aware that the net foreign exchange benefits to the Island from inclusive tours amount only to 10 percent of total expenditure when deductions are made for takings of overseas airlines, foreign tour operators, imports of provisions for tourists and repatriation of profits by foreign hotel developers. Other studies do not reveal such a high import content as for Mauritius; but they do suggest that it is misguided to assume that tourism has a lower import content than other industries and therefore deserves preferential treatment. In 1958, a study by Professor George Cumper of the University of West Indies showed that 39 percent of Jamaica's tourist income went straight out of the country, the main import content being food. Further, since less than half the hotel bedrooms in Jamaica are owned by Jamaicans, there is clearly a substantial leakage from that source as well.

Increasingly the tourist industry is being dominated by international companies not based in the destination countries. This gives rise to a related problem about the taxation of profits. In the future, more and more tourists will travel on inclusive tours; and the more inclusive a tourist's program becomes, the more he will pay to international companies owning aircraft, hotels and other tourist services. These companies can so arrange their bookkeeping that the hotel subsidiaries in the destination countries make no profits and pay no tax. The trading subsidiary, especially if it is located in a tax-haven, simply buys the accommodation at a cost which covers

operating costs. Other drains on foreign exchange take place when expansion of the tourist industry requires the import of capital goods.

The last economic disadvantage arises when overdependence on tourism makes the economy vulnerable to changes of fashion. While tourism is indeed a growth industry and the total volume of traffic is likely to grow for the foreseeable future, individual destinations may not share in that growth for a number of reasons — wars, industrial unrest or simply changes of fashion. The Irish Republic, which derives 15 percent of its foreign exchange requirements from tourism, has been badly hit in this respect. Other countries have simply fallen out of fashion. Monaco, for example, had 70 hotels and 3,580 rooms in 1939, but 30 years later it had only 31 hotels and 1,650 rooms. The aristocracy passed it by, and the new generation of tourists could not afford it.

The environmental disadvantages are those which all too often accompany the over-exploitation of tourism; despoliation of coastlines, pollution of the sea, loss of historic buildings to make way for tourist accommodation.

Perhaps the biggest environmental casualty has been along the Mediterranean Sea, largely as a result of over-development of the coast for tourist purposes. Every one of the 6,000 registered beaches in Italy is dangerously polluted according to standards decreed by the Italian Health Ministry; some beaches have bacteria counts five times higher than the limit. The building on the coasts of Southern Spain, along the Italian Riviera and the Viareggio coast and the Adriatic have destroyed completely the character of the area. Hundreds of miles of coastline have been ruined irremediably by virtually uncontrolled building of hotels, restaurants, bars and houses. Beaches have been divided into unsightly allotments, and noise from jukeboxes, fumes from traffic and sheer human overpopulation pay witness to the chaos man has made of the organization of his leisure. These consequences are not inherent in the development of tourism; they just happen when tourism is developed in a thoughtless and casual way.

Some of the larger national parks in Africa are now suffering from an accumulation of overcommercialization, and this is another aspect of the environmental damage that can be caused by tourism. Elsewhere in Africa the character of parks is being altered by the proximity of airports, buildings and hotels, and the sheer volume of visitors.

It is of course true that the development of any new industry involves some change in the environment. The particular disadvantage with tourism is that those changes take place where the environment

is at its most attractive and where it is most vulnerable. The interest of the tourist industry might, in time, lead to an enhanced appreciation of national environments, but their preservation would require a degree of planning and control that has not been usual in this industry.

The final disadvantage of tourism has been called an administrative one. The ownership of land and the control of components of the tourist industry are increasingly in the hands of non-residents and of companies based elsewhere. In many countries the local resources are not available to finance the development of the tourist industry, or to acquire control of it in subsequent years. This gives rise to serious conflicts of interest as to how the tourist industry as a whole should be developed or controlled. What has happened too often is that those outside interests have acquired the best sites and the beaches and have then exploited them in such a way that an overall tourist plan, devised at a later date, cannot be implemented. A good example of this is Mauritius. Development was left entirely to private industry, much of it foreign. Tourism was developed in an uncoordinated and fragmented way and, in particular, it resulted in the extravagant alienation of the best coastal sites which has now seriously prejudiced the success of any comprehensive tourist development plan.

Planning for Tourism

What is the answer to all these problems which the development of the tourist industry, albeit unwittingly, is creating? How can governments respond in order to diminish these problems? There are indications that the degree of assistance given to the tourist industry may exceed that which can be justified by rational argument. The right answer is surely to identify in advance the appropriate volume of tourism which a country can absorb, to derive from that a coherent tourist plan with predetermined objectives and to assemble the machinery to implement it. Planning for tourism must be completely integrated with planning for other objectives, and growth must be restrained where it prejudices the attainment of these other objectives. The Overseas Development Administration have put their finger on the problem:

"Almost without exception, the tendency in the tourist business is to push 'development,' that is to get more tourists, and to increase expenditure per tourist. What is lacking however is program development that will control the tourism process... The fact is that a community or country that invites millions of tourists and at the same time institutes no program to protect itself will be overwhelmed."

The main obstacle to this rational approach is, in most countries, the Ministry of Tourism. Where there is a powerful ministry responsible for promoting tourism, which is under no obligation to reconcile the consequences of its activities with other ministries, an unbalanced approach is inevitable. The activities of these increasingly powerful departments need analysing so that one can assess the broader implications of what they are doing, and in particular so that one can see to what extent the objectives mentioned earlier are being achieved and to what extent unforeseen consequences are interfering.

The activities of the tourist authorities vary from the broadly laissez-faire right through the spectrum to the highly interventionist and cover, in that order, the following: the provision of information services to those tourists who have already arrived; the promotion overseas of the country concerned as a tourist destination; the supervision of the tourist industry, for example, through the grading of hotels, registration of travel agents or administration of a hotel reservation scheme; and, as an extreme, the ownership and control of all the components of the tourist industry. An analysis of tourist promotion costs carried out by IUOTO showed that member organizations in 67 countries spent £38 million in 1970. In that year Europe overtook North America as the major spender on promotion, disbursing £23 million. (These figures exclude advertising by national airlines, which are usually an arm of the government.)

According to the powers which they have, tourist authorities vary from little more than voluntary trade associations with a small staff to fully-fledged government departments with an army of civil servants headed by a minister. The trend is indisputably away from the amateur towards the professional. The first step must be to incorporate the plans of tourist authorities with other national plans. An integrated approach would then be possible, avoiding the conflict inherent in the present situation of dual responsibility.

There are signs of a more rational approach being adopted in countries where the need to avoid over-development is recognized and the appropriate machinery is being assembled. In Luxembourg, the Ministry of Tourism is embarking on a five-year plan, and the development proposals are linked with environmental improvements and an anti-pollution policy. In Zambia, Mr. Kazembe, the Zambian National Tourist Board's Production Officer, is on record as saying that "Zambia realises that tourism is a highly sophisticated and delicate industry, and the Government's plan is to develop a carefully planned and closely co-ordinated industry. Large groups of low-priced package tours is a short-term policy." South Africa is likewise moving towards a centrally determined tourist policy to achieve predetermined objectives. In Yugoslavia, responsibility for

the organization of tourism is being delegated to regional government, and while this will lead to slower growth, it will be of better quality and will be coordinated with other regional developments. At the Annual Conference of the Caribbean Travel Association in 1972, the idea that too many tourists can be a bad thing was advocated by speaker after speaker, who condemned foreign hotel owners, developers and managers for their lack of knowledge of the region, for their architecture, foreign menus, lack of hospitality and high prices.

It is possible, however, to over-plan and to introduce controls which are too rigid. In East Germany, one has to pre-book for a visa; and a visa to visit is only issued when a hotel bed has been reserved. The same formalities are necessary if one visits Russia, and the Russians are clearly going to have to decide quite soon how they will control their tourist industry. At the moment, they need 20,000 linguists as guides for 2 million tourists, and, by all accounts, a substantial number of night porters and escorts to protect the tourist. With a target of 10 million tourists by 1980, the existing ratios of guides to guests will have to give.

The time has now come for national governments to take the Goddess of Tourism off her pedestal, and to place her in the garden with all the other statues. For too long, governments have assumed unquestioningly the benefits from tourism and have encouraged it to expand. The undesirable consequences have been swept under the carpet. It is to be hoped that this decade will see a more rational and coherent approach to tourism development. If countries where saturation limits are being reached were to plan for limitations on their growth of tourism, this would probably have its main effect in parts of Europe. As a result, tourism to alternative areas such as Asia or Latin America, or parts of Africa, might be able to attract more of the probable overall growth.

[Extracted from Chapter 7 of
Tourism: Blessing or Blight?
Middlesex, England: Penguin
Books Ltd., 1973, Copyright
© , George Young, pp. 132-168.]

A Critical Assessment of Tourism in the Caribbean

John M. Bryden

[This article presents the concluding chapter to a detailed study of the cost and benefits of tourism in the Caribbean islands. The analysis indicates that the net social returns on tourist investments are lower than has been thought; but the reasons for this result can be specified, and there are several policies which could be adopted to appreciably increase the social gains from tourism.]

The potential benefits of tourism to developing countries may be apparent to many, but discussion of them is invariably confused. Proponents of tourist expansion in developing countries point to the foreign exchange receipts generated by tourism, or at a more sophisticated level to the impact of these foreign exchange receipts on gross domestic product either directly or through the operation of the expenditure multiplier. Critics of tourist expansion, on the other hand, point to the various social strains which are caused by tourist development, examples being the distortion of indigenous cultural expressions, the conversion of small farmers into wage laborers due to the high land prices which tourism creates and associated alienation of land, perpetuation of racial inequalities and the erosion of dignity. The implication of this style of criticism is that, whatever the economic benefits, these largely unquantifiable ("transcendental") costs are of sufficient weight to argue against further expansion of tourism in the countries concerned.

Economic costs associated with tourist development have received scant attention in the literature. Many have admitted the presence of such costs, but the

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general impression given is that they are negligible in comparison to the benefits. Still rarer are studies which attempt to measure the costs and benefits of tourist development in terms of social opportunity costs and returns. In fact, I know of no such study in any country.

It was the purpose of this study to attempt such a reconciliation of costs and benefits, to examine the social aspects of tourism, and to consider the dynamic impact of the tourist sector. Emphasis was placed on the likely impact of tourism in the existing institutional and political context, rather than on its potential. The discussion that follows summarizes the conclusions reached on the basis of a detailed study of the costs and benefits of tourism in the Caribbean area. While the Caribbean islands are not identical in all respects to all developing areas there are many features which these islands do have in common with a number of developing countries. They rely on export markets in industrial countries. They have small internal markets and limited import substitution possibilities. Population growth is fairly rapid, and in some instances there appears to be growing unemployment in spite of relatively high rates of growth of gross domestic product. Property, land and incomes are unevenly distributed to a degree noticed by the most casual observer. Agriculture is still an important source of income and occupation, though food production for domestic consumption has shown little sign of growth. Finally, there are common strands of history: colonial rule by a metropolitan power, racial conflict, and the division of economic and political power. It is therefore suggested that the information presented and the method of investigation used here may have some relevance for other developing countries which have embarked, or are proposing to embark, upon a tourist development program.

Some Conclusions from the Study

Recent economic changes in the smaller islands of the Commonwealth Caribbean were examined against the background of political fragmentation, geographical isolation and similarity of resource endowment. Because the small islands lack significant elements of complementarity in their resource endowments and production structures, and because, partly as a result of this, they are each nation states in their own right, each island is best considered as an individual economic and political entity. As such, the islands of the region must be considered very small indeed in terms of both population and land area. Population density is generally high, especially by reference to cultivable land, which is itself unevenly distributed among individuals. Mineral resources outside the larger islands of Trinidad and Jamaica are largely absent in commercially exploitable deposits. These features serve to explain the extreme openness of the economies, and the limited potential for development of manufacturing industry either on the basis of locally produced raw materials and/or on the basis of import substitution. Against such a background the rapid acceptance of tourism as a leading growth sector in the Caribbean,

based on the relative proximity to North America and considerable natural endowments of "basic" tourist assets of sun, sand and sea, has been a natural reaction of governments whose room for maneuver in economic policies and scope for expansion in alternative export or import substitution industries has been severely restricted.

All of the smaller islands have experienced fairly rapid rates of growth of population which, through the effect of this on the age-structure of the population, means a relatively low population of working age. But the evidence available suggests fairly high participation rates for men, the quite marked variations in overall participation rates between islands being mainly explained by considerable variation in female participation rates. These, in turn, reflect variations in employment opportunities for women. A large proportion of the population of working age have primary education only and, especially in the smaller islands, lack formal training, facilities for which are largely absent. There is, however, a small and highly educated elite with university education or its equivalent.

Little reliable evidence exists regarding the change in the structure and level of employment in the region during the decade under study, but some changes can be inferred from the changes in economic structure in the region and recent evidence relating to the Cayman Islands, the British Virgin Islands and the Bahamas. This suggests a declining proportion of the labor force in agriculture and, for most islands, an increase in employment in construction, services and hotels and, possibly, commerce. Since services, hotels and commerce are important sources of employment opportunities for women, it seems possible that the trend towards lower female participation rates, at least in 'formal' wage employment, noted after the 1960 Census, may have been arrested and, in some cases, reversed. But the vulnerability of the economies to male unemployment has probably increased owing to the increased significance of construction based on capital inflows.

Evidence from those islands with relatively larger tourist sectors suggests a higher requirement for trained and skilled labor. But the absence of training facilities, the low general level of formal education and the international mobility of trained and skilled labor have meant the appearance of deficit sectors in the labor market even, apparently, in the larger islands more commonly characterized as having a labor surplus. The better jobs have tended to be filled by expatriates, so that the benefits of the (in some senses) 'superior' employment structure in these tourist economies have tended to flow largely to expatriates rather than to the indigenous population.

An analysis of changes in economic structure in the region attempts to show at the 'macro' level what the effects of rapid growth of tourism in the smaller islands have been. The hypothesis advanced is that tourism has grown in competition with other sectors, principally export

and domestic agriculture. This takes the form of quasi-static competition for human resources, and sometimes land, together with quasi-dynamic competition for the particular resources which would serve to change the production functions in agriculture to meet changing resources availability — in particular skilled manpower and domestic capital, especially that part which is available to government. On the demand side, there is reason to suppose that tourists and/or expatriate employees may well influence the consumption patterns of local people with whom they come into direct or indirect contact. Such an influence would almost inevitably mean a switch from locally produced to imported commodities. Such a process, operating through the supply of factors, and the demand for locally produced commodities, would explain many of the structural changes which have taken place in those islands which have experienced rapid growth in their tourist sectors during the decade, notably a tendency for the propensity to import to rise, and for both domestic agricultural production and production of agricultural commodities for export to decline.

Although tourism in the Caribbean is not of very recent origin, it is only in the past decade that it has reached any significant size in most of the smaller islands of the region. Growth rates of visitor arrivals of between 15 and 20 percent per annum, with corresponding growth in tourist receipts, were common in the smaller islands during this period. The most important source of this growth has been North America, whose tourists now constitute over half the total arrivals in all but the Windward Islands and Trinidad and Tobago. The West Indies themselves are the next most important source of visitors, but a very high proportion of this group appear to stay with friends and relatives, though they also stay at guest houses and the smaller, more modest hotels. Because the peak months for West Indian tourists are in the off-season, they do tend to alleviate the effects of seasonality in the main groups of other visitors. Nevertheless, occupancy rates in hotels vary very significantly between winter and summer, and are generally low over the year as a whole — quite often 50 percent or below. Since the growth in hotel capacity has kept pace with the growth in arrivals, the utilization of capacity has improved only slightly as a result of a steady rise in the proportion of visitors staying in hotels.

It is hotels that receive the largest proportion of visitors and tourist receipts in the Caribbean, and subsequent concentration on the impact of hotel and guest house tourism, as opposed to cruise ship tourism or real estate type developments, is justified mainly on these grounds. It is also the case that while hotel investment during the decade has been considerable, a substantial proportion of new hotels are foreign owned. Although the average size of hotel tends to be small — around 30 rooms — there are signs that this is increasing, this again being indicative of the pattern of ownership insofar as most indigenous involvement is confined to the smaller hotels and guest houses.

The majority of hotel sales are to foreigners, domestic purchases from this sector tending to be insignificant in most islands for which data are available. The two most important categories of inputs in this industry are payments for commodities, a high proportion of which are imported, and payments to households in respect of wages and salaries. The input structure, however, changes in a non-linear fashion as occupancy rates change. Direct employment in hotels usually works out, on average, at about one employee per room, although substantial variation occurs according to the season. Some evidence exists to suggest that the burden of seasonal unemployment in the industry tends to fall on women, who form a much higher proportion of employees in hotels than in the economy as a whole. This female employment is concentrated in the semi-skilled and unskilled categories. In the two islands studied in greater depth, a very high proportion of skilled and professional jobs in the hotel sector were held by non-nationals, and a minimum estimate of the proportion of wages and salaries in hotels accruing to non-national employees in the one island where data permit such an analysis is around 43 percent. So far as semi-skilled and unskilled grades are concerned, little evidence exists to suggest that earnings are higher than elsewhere in the economy, and some evidence suggests the contrary. Since the bulk of such employees are women, this reflects the lack of female employment opportunities elsewhere in the economy, at least to some extent.

The role of the governments of the smaller Caribbean islands in promoting tourism, and the costs which are implicit in this role may be analyzed under four main headings. First, fiscal policies including incentives offered in respect of various types of investment in tourism are examined: it is argued that costs exist as a result of specific concessions granted under hotels aid legislation, and of special additional concessions granted to specific developers. Second, the provision of infrastructure and utilities related to tourism has had a substantial price during the decade even though adverse comments occur from time to time on the adequacy of tourist infrastructure and utilities in the smaller islands of the group. In fact, in terms of monetary investment some evidence exists to suggest that governments have had to match the contribution of private investors in tourism almost on a dollar-for-dollar basis. Third, the contribution of governments through training and tourist promotion activities is considered. For the smaller islands at least, expenditure on training has been very small and can safely be ignored. Promotion is carried out through the medium of tourist boards and consists almost entirely of advertising expenses in Europe and North America. Such expenditures are very variable in the region, ranging from a low of \$1 to over \$10 per tourist. Most reports on tourism in the region have, however, recommended considerable increases in this form of expenditure. Finally, physical controls and land use controls are

discussed, although this area of government involvement and the associated problems remain largely untackled in the smaller islands of the region. One can safely conclude from the analysis of the role of the governments in encouraging, supporting and promoting tourism in the region that the associated costs have been very substantial. Consequently, such costs must be identified and incorporated into any analysis of the social costs and benefits of tourism.

The multiplier approach which has been used in several studies, and which applies rather generous multiplier values to tourist expenditures without considering the import costs, may be rejected as yielding no useful guidance to policy makers regarding the merits of tourism as compared with alternatives. Partial analysis shows how, as we attempt to make the multiplier model more realistic, the real income effects of tourist expenditure are reduced. The social cost-benefit analysis, while omitting some variables due to lack of information, does enable some comparison to be made with alternatives as more data become available. Bearing in mind the 'minimal' rate of interest on government funds of around 6 or 7 percent, it permits some judgment as to the acceptability or otherwise of the social rate of return to investment in tourism over the period under study. Even with fairly conservative assumptions, the present social rates of return from hotel development are sufficiently close to the 'minimal' accounting rate of interest to suggest that net social benefits from tourism are rather small in the Caribbean. These results are highly sensitive to the value of the 'shadow' wage rate, which depends on alternative opportunities for employment and consumption, on the extent of foreign ownership in the industry and the availability of local loan funds to these foreign investors, on the extent of employment of non-nationals whose income does not form part of the social welfare function which governments seek to maximize, and on the value of public sector investment which is associated with the particular form of tourist development.

To state that this study has provided a definitive economic case against the further development of tourism in the Caribbean would be going too far. Nevertheless, the consistency between the findings of the micro-analysis and of the macro-analysis does raise some very serious doubts about the viability of tourist development in its present form, at least for the smaller islands of the Caribbean, and suggests that under certain circumstances a perfectly recognizable economic case can be made against tourist development without necessarily calling upon the various kinds of external diseconomy or on transcendental costs which may be associated with tourism in developing countries. Since the circumstances identified are obviously not unique to the Caribbean this conclusion would seem to be of some significance. The economic case for tourism in developing countries seems to have been largely taken for granted, most of the arguments against being framed in largely 'transcendental' terms. Indeed, it is possible that the explanation of at least part of those costs which are normally thought of as being within such a category

lies in the low net social benefits and in the distribution of costs and benefits within the society itself.

The circumstances which appear to be important for the main conclusion of this study are first, the degree of foreign ownership in the industry, which means that the surplus either accrues to third countries or to individuals whose welfare does not form part of the welfare function which governments seek to maximize; second, for similar reasons, the employment of non-nationals in skilled and professional positions in the industry; third, the extent of government involvement through the provision of infrastructure, the granting of incentives and in other ways which involve a real resource cost to the nation. By comparison, the effect of the failure of the hotel industry to purchase a higher proportion of its food locally, while not unimportant, may be rather small. The effect of tourism on agriculture achieves its significance mainly in the competition for resources which the past growth of tourism has involved in the region, and possibly also through the effect of tourists and/or non-national employees on the pattern of demand.

The low social rate of return is consistent with a substantial net gain accruing to some groups in the society, while others are net losers from the process of change involved. Although it has not been possible to incorporate distributional objectives within the analysis to any significant extent, both because of data inadequacies and because one often lacks a clear idea of these objectives in the case of Caribbean governments, it is possible to make a few qualitative observations on the distributional effects of tourist development in the region. In the circumstances prevailing during the decade the most likely group of losers are the small peasant farmers, whether they own or rent their land. For while plantation owners may lose their labor force, or at least face a rise in the supply price of labor, they are in a better position to substitute capital for labor where such substitution is permitted and, because they have clear title in law and own large blocks of land, usually in the more fertile areas closer to, or even bounded by, coastal areas, can look forward to rising land prices associated with tourist development. Small farmers, on the other hand, often lack clear title even where they own their land, are unable to substitute capital for labor, tend to be situated in areas which do not benefit from rising land prices, lose their family and hired labor and tend to lack political power. For them the alternatives are to retreat into semisubsistence or to join the labor force as unskilled labor. Other groups will also suffer if forced to purchase imported foods, often processed, in place of local foods when the supply of local foods declines. Insofar as it is the lower income groups who tend to purchase a high proportion of domestically produced food, it will be the less well-off who tend to suffer from this change. Still other groups will suffer because with rising land prices near to the growing centers of employment they find themselves no longer able

to purchase a plot of land to build a house on. Moreover, the building regulations introduced with the intention of controlling residential development and hotels tend to affect lower income groups adversely both because of their complexity and also because the traditional way of building houses, perhaps over a period of time with the help of family and friends, is not catered to by such legislation. Finally there is the fiscal structure itself with its heavy reliance on import duties on necessities, which suggests that a relatively large part of the burden of financing the contribution of government to tourist development falls on the lower income groups.

The low rates of social return to tourist development, taken together with the tentative suggestions regarding distributional effects which have not been satisfactorily included in the analysis, can explain why hostility or animosity towards tourists and towards those connected with the tourist business arises in certain circumstances. On the other hand, it may be going too far to suggest that such animosity would disappear if the rate of social return on tourist investments were raised and if the benefits were distributed more equitably; there may be good reasons in the realm of social psychology to suggest why this would not necessarily be the case. But one may fairly conclude that, on the basis of the findings of this study, the campaigns launched by the Bahamas and Jamaica, to name but two, to enlighten the people about the benefits which they derive from tourism, in an attempt to counter such animosity, rest on a misunderstanding on the part of those responsible of the effects of tourism on the lower income groups in society.

Future Policy Choices

It is convenient to analyze the future policy choices open to the small Caribbean islands under two main headings. First, within tourism itself there are measures which could be taken to raise the net social benefits arising from this industry. Second, the alternatives in other industries, whether or not these supply inputs to the tourist sectors, must be examined. Within tourism itself, the analysis suggests at least four major areas of policy which could significantly alter the social benefits arising from future tourist development. First, policies as to the structure and ownership of the industry would appear to be of some importance. So long as growth in the industry is based on large luxury hotels, then it seems almost inevitable that ownership will remain in foreign hands. One alternative would be public ownership, though the smaller islands would find it difficult to raise funds for this type of investment, and might also find themselves forced to employ foreign managers or even sign contracts with foreign firms who specialize in management of hotels of this kind. This could be both politically awkward and economically costly. Nevertheless, there would seem to be room for rather more experimentation in public ownership than has been the case to date, though this need not be in large luxury hotels. Further development of the more 'indigenous' smaller hotels and guest

houses, possibly within the range of a broader band of indigenous private investors as well as government, would seem to be worthy of closer examination, since experience in large bureaucratically organized business would be less important, and the distributional implications might be more acceptable. At present, the hotel developments in the region seem to be predicated on the assumption that the only market worth exploiting is that represented by upper income groups in North America and Europe. While this may be true from the point of view of the private investor, and possibly also from the point of view of tour operators and airlines, it is quite probable that different conclusions would emerge from a consideration of social costs and benefits.

Secondly, the structure of employment opportunities and related policies regarding the employment of non-nationals in skilled and professional positions would seem to be worthy of close scrutiny. An allied point concerns the failure of the hotel industry to train indigenes to fill positions currently filled by expatriates. Again, casual observation would suggest that guest houses and smaller hotels require a somewhat different structure of employment, catering as they do for simpler tastes and being less orientated towards the highly sophisticated standards of cuisine, accommodation and management thought to be required by the tourist market currently being tapped by the larger hotels in the region. But if large hotels remain, as seems likely, then work permits should only be granted for limited duration and on condition that the period involved should be used to train indigenes to fill the posts at the end of the period. Obviously such work permits should be granted for well defined skilled jobs only if indigenes are not available. Although in theory such a restriction operates in some territories, in practice the operation of work permit regulations usually leaves a great deal to be desired.

Thirdly, the future needs in respect of infrastructure and utilities would seem to be worthy of close analysis with a view both to their minimization and possibly also to shifting the burden of their provision on to the private investor. With both 'priced' utilities and 'unpriced' general infrastructure an adequate social return must be assured. In some cases this will no doubt require changes in pricing policies. A related point concerns promotional expenditures through tourist boards which can all too easily reach large proportions without very clear ideas of the responsibilities of these organizations, or the objectives of such expenditures.

Fourthly, as regards fiscal policies and incentives, it is almost certain that the specially negotiated concessions in the smaller islands, yield very low rates of social benefit, and very likely that the general incentives offered also yield low social benefits. If any incentives are to be given, a case could be made for arguing that these should be to encourage indigenous participation in guest houses and

smaller hotels, at present largely excluded from incentives legislation through the criteria relating to minimum size. In general, the fiscal system must be designed, so far as possible, to ensure that losers from the inevitable structural changes are compensated by beneficiaries. The systems which relieve taxes on imported luxuries on the grounds that this increases tourist expenditures are unlikely to be consistent with this objective.

Apart from the tourist industry itself, alternative opportunities need to be assessed on comparable terms. Given the size and population of the smaller Caribbean territories, and their endowments of natural resources, it is difficult to see socially profitable opportunities of any size arising in the field of manufacturing industry, even within a common market which embraced these smaller islands. And within a regional common market which embraced large and small islands, the fear is that all such industry would migrate to the larger islands. Two areas where socially profitable opportunities for the small islands are most likely to exist are in export and domestic agricultural production, including livestock and fisheries within these sectors.

But there is little hope of achieving growth in these sectors until the competitive demands of tourism, discussed earlier, are reduced. Thus to predicate, as the Zinder Report does, increased benefits from tourism largely on the basis of increased domestic production of foodstuffs, while at the same time predicting the growth of tourism solely on the basis of demand factors is, in the view of this study, to misunderstand the whole process of economic change in the smaller islands of the Caribbean during the past decade or so.

But when all the alternatives have been carefully explored, it is likely that tourism in some form will be almost inevitable for at least some of the smaller islands of the region, with or without a wider political union than at present seems likely. If this is so, then the findings of this study would suggest that progress towards higher real incomes for the bulk of the population is likely to be slow, much slower than is suggested by most previous studies in the region, and that to achieve such progress considerable change will be required in the structure of the tourist industry, as well as elsewhere in the economy.

[Extracted from Tourism and Development: A Case Study of the Commonwealth Caribbean: pp. 1, 3 & 213-221.

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Small Hotels: A Proposal

Donald H. Niewiaroski

[The organization of a small hotels corporation for development of a type of tourism in the Caribbean that would be less like that of Miami Beach could offer numerous advantages, both to the tourists and to the people of the host countries concerned.]

Some of the aspects of tourism in the Caribbean that have been increasingly criticized in recent years are illustrated in the following quotations.

C. L. R. Jones, for 50 years one of the Caribbean's leading intellectuals, stated in 1973: "To really be independent they (Caribbean nations) will have to open a struggle with . . . worldwide corporations who still control life in the Caribbean. "

The Prime Minister of St. Vincent, at the 1972 convention of the Caribbean Travel Association, delivered a policy statement entitled, "To Hell With Paradise. " In it he said his nation would screen carefully outside investments in tourism to avoid the creation of a "Miami Beach along any of 22 miles of white beaches in our country. " He went on to say, "These projects will have to have a large and permanent value to our people and be of permanent interest to visitors. " He added that "tourists will be welcome to visit St. Vincent and share the things we like. " He concluded by saying "a country where the people have lost their soul is no longer a country and not worth visiting . . . I know there is a market of people who want to get away from some produced perfection, whose idea of a

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holiday is not "heaven" but participation in a different experience. Our island, our villages, our small hotels can offer these. "

Dr. Ernest Dichter, President of the Institute for Motivational Research said, as far back as 1967, at the International Travel Seminar, "Too many modern hotels are unfortunately isolated from the culture in which they have been constructed. At best there may be some folk dances, or a ten minute contact with the local native waiter at a restaurant . . . Too often the traveler feels that all the country is interested in is getting his money. "

There is a real feeling that too much tourism can rob the place of what it offers as its uniqueness. Witness the "in" places to be, which flourish for a few years. Their uniqueness is stripped away when they become popular, and the tourists flock to another "in" spot. In its Working Paper on Tourism the World Bank identified tourism "as a threat to the indigenous culture and mores, and there is a real possibility of a serious deterioration in standards of local arts and crafts as efforts are made to expand output to meet the tourists' demands. "

In sum, the developing countries believe they are not getting the share of tourist expenditures that they think they should. They believe they exercise too little control over tourism assets and programs. They see their way of life changing to suit the demands of the tourists. At the same time the tourist is not getting what he wants. He pays high prices, at least he perceives them to be high. He believes he gets poor service in return. He discovers that what he has traveled thousands of miles to see and experience is not very much different from what he left behind. He is offered mostly skyscraper hotels with labor-saving devices — precisely what he finds at hotels in New York or Miami.

Solution

The World Bank and others have suggested a variety of worthwhile activities to ameliorate these problems. For example, assessment of market demand has been suggested as being critical to determining the kind of tourist traffic which a country should seek out. Investment incentives and cooperation between governments and private investors is yet another broad area which requires attention, according to some experts. However, as pointed out by the World Bank, such incentives may lead to over-investment and waste of scarce capital. These solutions, and others like them, are much too broad to be of practical help to the developing countries and the tourists now. They need to be translated into specific things that local governments, local investors and foreign investors can do together. Formulas for equitable sharing of responsibility and profits need to be developed.

A solution which specifically addresses the problems and themes outlined above, is the creation of a Small Hotel Corporation (SHC). Here

is how it might work, particularly in the Caribbean. The SHC would be jointly owned by the developing countries (public and private sectors) and foreign investors with some form of participation by a major international hotel chain. The SHC would begin by franchising several small hotels as show-case projects. They would be owned by local entrepreneurs. They would charge low to medium rates. They would have access to the technical and managerial supervision of the international hotel chain, as well as central purchasing resources.

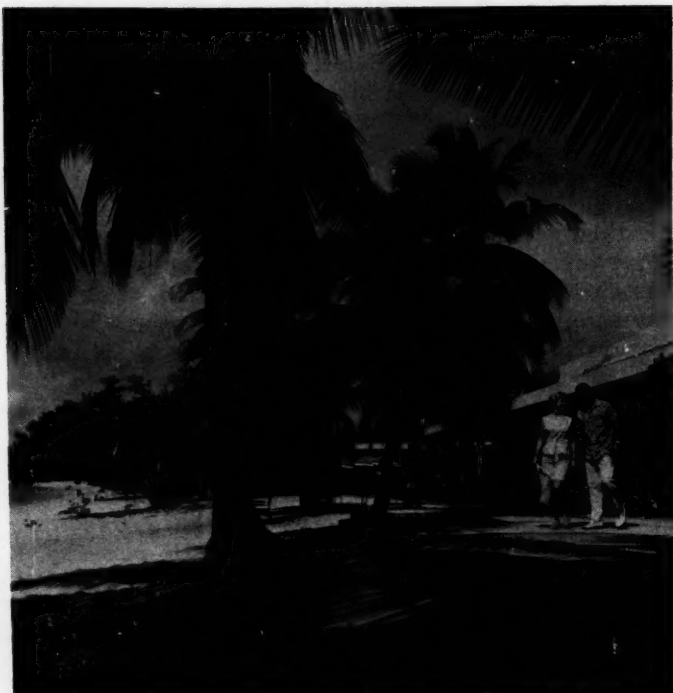
The small hotels would be planned to retain their indigenous charm, local style, local food, local architecture and local entertainment. They would offer an ambiance of local culture which cannot be offered by the large, multi-storey hotels. Hotel supplies, and employment, would be more fully provided from local sources. Reservations and promotion would be handled through the participating international hotel chain's existing reservations and promotion network. This would ensure that the small properties would receive adequate exposure to their major markets. Potential visitors could make reservations easily, without delay and without extra cost, and hotels would obtain a flow of visitors suited to their capacities. This program could be integrated into the existing reservation network of the hotel chain at minimum cost.

The financial arrangements would be fairly simple. The SHC would receive income from an initial one-time franchise payment from each franchisee and from a continuing percentage of the gross room rentals. The participating international hotel chain will receive a share of the SHC earnings in exchange for its management, technical assistance, promotion and reservation service. The host country investors will likewise share in the earnings of the SHC in exchange for loans and/or guarantees. Loan capital for improvement and expansion of properties would be obtained by SHC, with debt service for these loans paid out of SHC earnings. Since the individual franchisees will receive management and technical assistance from the SHC, they will benefit by the increased revenues and profits resulting from better management, cost control and improved occupancy.

There are a number of successful small properties in the Caribbean. If these could be amalgamated within an SHC, then in effect, the small properties would have created their own large, multinational corporation. Through the SHC, they would share in the responsibilities, management and rewards.

Some islands in the Caribbean have initiated successful small hotel programs. Jamaica's "Inns of Jamaica" is innovative and has had some degree of success. Puerto Rico is developing new concepts which relate to a market demand for less expensive facilities. A key element in this new approach is the establishment of small inns, or "paradores," which will display Puerto Rico's varied environment and

offer truly new experiences to the traveler. In September 1972, the Caribbean Hotel Association established a Small Hotels Advisory Committee to offer small hoteliers training seminars at various islands in the West Indies. About six such seminars have been conducted. Representatives from successful hotels, airlines, and tour operators, and other experts constitute the teachers.



Hotel in St. John,
Virgin Islands
(Photo: U.S. Department of Commerce).

By combining under an SHC, the small hoteliers in the West Indies would be able to offer an alternative to the skyscraper hotel atmosphere of mass tourism. The small hotels could accomplish this easily and at a relatively low room price. They would offer the vacationer the true ambiance of their islands. It would represent the culture which the residents of the islands cherish — they would offer themselves and their unique hospitality, with a chance to participate in management, ownership and profits.

[Unpublished study, prepared while the author was Director of International Development Projects at General Research Corp., 1972.]



MULTIPLE CROPPING

EXPERIMENTAL RICE FIELDS AT THE
INTERNATIONAL RICE RESEARCH INSTITUTE, PHILIPPINES,
WHERE RESEARCH ON MULTIPLE CROPPING IS ACTIVE.
(PHOTO: U. S. DEPARTMENT OF AGRICULTURE).

Multiple Cropping in Developing Countries

Dana Dalrymple

[The growing of several crops in the same field during one year is a significant way to increase agricultural output. The conditions under which this is possible, including climate and water availability, the contributions of technological changes, and the factors affecting the adoption of multiple cropping practices are examined.]

In evaluating prospects for increasing world food output, emphasis is traditionally placed on two dimensions: expanding the area under cultivation and improving the yield of individual crops. Little has been said about a third possible dimension: time. It is possible to make fuller use of time by multiple cropping — the practice of growing more than one crop on the same piece of land in a year. Multiple cropping makes possible both an increase in area cultivated per year as well as an increase in total yield per unit of area per year.

Although it might seem the most advanced of agricultural techniques, multiple cropping is in some ways an anomaly: it has an ancient history but its practice is still largely confined to the less developed nations. Multiple cropping was carried out well before the time of Christ in Iraq, Egypt and India; records show it in China in the 6th century AD, in Japan in the 13th century. Currently immense areas are so cropped in Asia. Yet the area multiple cropped in the developed nations appears to be extremely small. There are, of course, good reasons for the present pattern of distribution.

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The more advanced nations are found in temperate climates which severely limit the possibilities for multiple cropping. They can provide needed food supplies through traditional production channels or through imports. The developing nations, on the other hand, are located in tropical and semi-tropical areas, which provide more hospitable climates for year-round cultivation. Moreover, they are often more densely populated and living nearer the margin with respect to food supplies, so that multiple cropping has had to be employed.

Thus multiple cropping has more or less evolved over the centuries to meet local situations and conditions. It has not been the direct product of a formal scientific process, though technological advances in other fields have contributed to its progress. In fact, multiple cropping until the last few years hardly seems to have been the subject of any kind of concerted attention. However, the continuing surge in population growth and critical crop failures in the mid-1960s led to a more general concern with the question of how long the less developed world could feed itself. More recently there has been increased concern with such matters as the quality of diet, employment, and income. Multiple cropping, it is increasingly recognized, holds promise of making contributions on all these counts.

Concurrently with the growth of these concerns, a number of early-ripening, high-yielding varieties of wheat and rice were introduced which, in combination with vital inputs, have led to what is popularly known as the Green Revolution. Much of the discussion of these varieties is in terms of their immediate effect on output. But over the longer run, their greatest impact may come from the early ripening characteristics which often helps make it possible to plant an additional crop each season. Moreover, the inputs necessary for high yield are complementary to the needs of multiple cropping.

Research on multiple cropping itself is relatively new. At the international level, pioneering work has been done at the International Rice Research Institute (IRRI) in the Philippines [which has since expanded considerably — see next article]. Two of the newer centers — the Centro Internacional de Agricultura Tropical (CIAT) in Colombia and the International Institute of Tropical Agriculture (IITA) in Nigeria — have also recently initiated studies in this area in their research on farming systems. At the national level, the major research efforts are found in Asian countries; the biggest program is probably in India.

In this report, multiple cropping will generally refer to a regular sequence of more than one annual food, feed or industrial crops both planted and harvested in the course of a twelve month period, and grown in basically pure stands on the same piece of land under a system of permanent agriculture. This definition is, of course, arbitrary and excludes green manure crops, mixed farming, shifting cultivation, and most forms

of intercropping. Green manure crops are legumes grown for their soil improving qualities or as a cover crop and plowed in at the end of the growing season. Mixed farming can involve (a) the growing of annual crops under or with perennial crops (shrubs or trees), and (b) both the growing of crops and the raising of livestock.

Intercropping: in many tropical areas, more than one crop — in some cases dozens — is planted on a given piece of land. The various crops may be planted at the same or different times. Usually they are not planted in sequence, but several variants arise which could be counted as forms of multiple cropping. Perhaps the most easily included case is relay interplanting. This practice is rather widely used and involves the sowing or planting of a second crop between the rows of the first crop before it is harvested. Less clear-cut cases involve (a) relay interplanting where the period of overlap is rather extended (say several months), or (b) interplanting with crops having different maturation periods. Ratooning — the practice of letting a second crop grow up from the root structure of the first crop — is also practiced; it doesn't quite meet the definition used here because a separate planting process is not involved but could easily be considered a type of multiple cropping.

Multiple cropping in practice may involve the cultivation of two to nine crops in sequence on the same piece of land in a year. Double cropping is by far the most common, but triple and quadruple cropping are not unusual. Multiples higher than this usually involve a pure rotation of vegetables and are found in very limited market garden areas. (1) Monoculture. This involves a sequence of the same crop, such as corn after corn. Combinations of this type are generally not widely used except for rice, which is often double and in some cases triple cropped. (2) Duoculture is considerably more common and involves sequence of the same types of crops, such as grain after grain, or vegetable after vegetable. The grain combination might, for instance, involve rice and wheat, or wheat and millet. Innumerable combinations of vegetables are possible. (3) Polyculture includes combinations of different types of crops such as grain and pulses, grain and vegetables, grain and cotton, vegetables and pulses, etc. These combinations are also fairly common. Where the frequency is high, and multiple cropping is widely practiced, as on Taiwan, a wide variety of sequences are found. Different sequences may even be found on the same farm.

The statistics on multiple cropping take two main forms: the actual area planted more than once, and the multiple cropping index. The cropping index provides a measure of the relative extent of multiple cropping in a defined area — country, region, or sample of farms. If the total cultivated area is planted only once, the index value is 100. If 10 percent of it were planted twice, the index would be 110; if, in addition, 3 percent were planted three times, the index would be 116.

Although multiple cropping indexes may generally be closely associated with cropping intensity, they cannot be taken as a very fine measure of intensity of land use. The reason is that each crop has a different growing season; some, such as sugarcane or pineapple, may require more than a year. Thus if multiple cropping just means the substitution of two shorter-season crops for one longer season crop, the intensity of land use is not increased even though the cropping index may be doubled (and labor use increased if the crops are more labor intensive).

Some index values and acreage figures showing the extent of multiple cropping in recent years in countries where the practice is common are the following:

<u>Country</u>	<u>Year</u>	<u>Index</u>	<u>Area Multicropped</u> (million acres)
Burma	1965/6	111.1	2.2
China	1968	147.4	127.4
Egypt	1961/2	173	4.4
India	1966/7	114.4	48.5
Indonesia*	1964	126.2	5.2
Japan	1967	126	3.7
South Korea	1969	153.5	3.1
Pakistan	1967/8	108.5	3.0
Bangladesh	1968/9	139.2	8.5
Philippines	1960	136	3.0
Taiwan	1969	184.3	1.9

*Java and Madura only

Biological and Physical Aspects

Multiple cropping is not so much a technology itself as it is the product of a number of interacting technologies. Certain key ingredients such as irrigation and early-ripening varieties have long been available in certain regions of the world. But for many less developed nations today, these factors are relatively new or are present in new form. More widespread adoption has had to await the development of an increasingly scientific agriculture. The most significant technological contributions include improved plant varieties, water control, fertilizer, insect and disease control, and post-harvest technology. Mechanization may become increasingly important in the future. The fact that appropriate technologies are more widely available means that the potential for the expansion of multiple cropping is enhanced. There is, however, a great gulf between potential and reality; we shall review briefly some of the biological and physical factors which may influence the gap.

Climate. Multiple cropping is found largely in a belt between 10° south and 40° north of the equator. Three basic climatic zones are involved: the

cool-temperate; the warm-temperate sub-tropical; and the tropical, which in turn can be differentiated into the humid and subhumid. Climatic conditions in the countries involved normally allow cultivation year-round or over a long growing season. Given adequate heat, the multiple cropping pattern followed within this region is heavily dependent on the availability of water, either through rainfall or irrigation.

The distribution of rainfall varies among and within nations. Some Asian nations experience only one monsoon a year, while others such as Ceylon may have two. In West Malaysia there are two dry periods: from June to August, and December to February. In large countries like India, several situations prevail: there is only a summer rain in the vast central portion of the nation, while two rainy periods (though not of equal intensity) are found in the southernmost and northernmost portions.

Multiple cropping in Asia is often built around a summer (or wet season) crop of rice. This rice is grown either in irrigated or rain-fed paddies where the water can be impounded, or under upland conditions where water is not impounded. On paddy land, the first or summer crop is nearly always rice. During the winter (or dry season) this land may be planted again to rice, but is often devoted to another crop. Rice requires a great deal of water and generally can be grown only when irrigation is available. An exception is provided in the Sino-Japanese part of the rice belt, where winter rainfall is considerably heavier than in regions farther south; and since the winters are cooler, there is less evaporation.

In other regions, rice is less important as a base for the multiple cropping rotations. Depending on climatic conditions, various grains, vegetables, or pulses may be grown in the wet season. Where water is particularly short in the dry season, certain grains such as sorghums or millet may be particularly important. With the recent expansion of pumpsets, the variety of crops that can be grown in the dry season will be expanded. There are, of course, many other combinations of varying weather conditions.

Soil. The soil requirements for multiple cropping are basically no different than for other forms of intensive crop production. In each case, a deep fertile soil with good structure and texture is usually desired. These features can be modified to some extent by cultural practices, most notably by the addition of organic or chemical fertilizer.

Soils are most apt to present a problem for multiple cropping in the wet equatorial regions. In the tropical rain forests of these areas, soils are often relatively infertile due to leaching and contain limited organic matter. The clearing and cultivation of certain soils containing laterite can lead to hardening of the laterite and even to the formation of a rock-like substance. Yet there are exceptions even in humid tropical regions.

Younger alluvial soils formed by deposits along streams and rivers or by volcanic ash may be quite suitable for permanent agriculture and multiple cropping. Areas fertilized by the spread of volcanic ash are found most extensively in Java, in other islands of the Indonesian-Philippine archipelago and on some of the Andean slopes.

Varieties. Varietal characteristics play a key role in making multiple cropping possible and in determining cropping systems. One of the most important factors is time of ripening. The shorter the growing season required by individual crops, the greater the possibility of raising an additional crop within the available growing season. Thus increased availability of early-maturing varieties is generally associated with an increase of multiple cropping.

Perhaps the earliest example of this occurred in Mainland China. Ping-ti Ho suggests that early maturing rice varieties helped bring about the development of a double cropping system in China as early as the year 1000. Early ripening is now a characteristic of most grains in China. The development of the shorter season ponlai rice varieties in Taiwan in the early 1920s helped make it possible to (1) move from double to quadruple cropping in Central Taiwan by adding a winter catch crop and a summer crop between the first and second rice crops, and (2) add a third crop in Southern Taiwan.

It is also important that varieties grown in a multiple cropping rotation mature in a relatively set period of time. For this reason, photoperiod-insensitive varieties are desired. They tend to mature in a relatively fixed number of days after planting, and are less influenced in this respect by daylength than are photoperiod-sensitive varieties.

Further desired characteristics for grain varieties are: yield rather than vegetative responsiveness to fertilizer, short strong stems that limit lodging, as much natural insect and disease resistance as possible, and consumer acceptance. Those varieties which are to be raised in non-irrigated regions also may need to be drought resistant. Recently, wheat and rice varieties have been developed which have many of these characteristics. They are highly responsive to improved agricultural practices and this has led to their categorization as high-yielding varieties. The fact that they also tend to be photoperiod-insensitive has particular meaning for expanded multiple cropping.

Water control. Since few areas experience rainfall which is both adequate and properly distributed for multiple cropping, the practice is often closely associated with the availability of irrigation water and/or drainage programs. FAO data suggest that in eight Asian nations in 1962 the cropping index averaged 112 on irrigated land and 97 on nonirrigated land. Irrigation may be used to (1) increase the supply of water during the present single crop growing season, and/or (2) extend the growing season

over different parts of the year. While irrigation during these periods helps make multiple cropping possible, the relationship works both ways; multiple cropping may be necessary to justify the expense of putting in irrigation.

Throughout history, the areas which have practiced at least some degree of multiple cropping have generally been leaders in the early development of irrigation: Egypt, Mesopotamia, India, and Mainland China. The major exception was Campania in Italy which had exceptional soil conditions. Ping-ti Ho states that the provision of irrigation was the critical factor in contributing to the rise in the multiple cropping index in Taiwan from 1901 to 1943; the results of a statistical study for the period show a coefficient of correlation (R^2) of .80.

The current extent of irrigation in the less developed nations is presented in Table 2. The roster of nations listed includes nearly all of those which practice multiple cropping to any significant extent. Of the 20 listed, the only ones where to my knowledge, multiple cropping is not of some importance are Turkey, Argentina, Chile, Peru, Sudan, and Madagascar.

Table 2 — Area of Irrigated Land in Less Developed Nations¹

Rank	Country	Year	Area (million acres)
1	Mainland China	1960	182.9
2	India	1967	68.0
3	Pakistan	1965	29.8
4	Iran	1960	11.5
5	Iraq	1963	9.1
6	Indonesia	1961	9.1
7	Mexico	1960	8.7
	(Japan)	(1968)	(7.8)
9	Egypt (UAR)	1968	6.9
9	Thailand	1968	4.4
10	Turkey	1967	3.8
11	Argentina	1957	3.7
12	Chile	1964/65	2.7
13	Peru	1966	2.7
14	Philippines ²	1966	2.4
15	South Korea ²	1968	1.9
16	Burma	1965	1.9
17	Sudan	1967	1.8
18	Madagascar	1966	1.5
19	South Vietnam ³	1968	1.5
20	Taiwan	1968	1.4

¹Irrigated arable land and land under permanent crops.

²Rice Crop only.

³Excludes several provinces.

SOURCE: — Production Yearbook, 1969, FAO, 1970, pp. 9-10

The quality of irrigation varies extremely widely, and much of the land listed as irrigated is undoubtedly very inadequately covered. In some, perhaps many, parts of the world, irrigation systems were not designed to maximize output per acre but rather to spread the available supply as widely as possible in order to reduce the possibility of crop failure.

Quality is particularly apt to depend on whether canal or well irrigation is utilized. Canal water is normally obtained from streams or rivers and hence the quantity available is largely dependent on seasonal flows. Thus when canal water is needed most in the dry season, it is likely to be (depending on reservoir capacity, if any) in the scarcest supply. This has led to the rationing of water in the winter in Pakistan. In Maharashtra State in India, canals and tanks (reservoirs) reportedly supply water on a perennial basis to only a small proportion (0-15%) of the area commanded by these works. Other problems with canal water center about timing: getting what water there is to the right field at precisely the right time during the growing season.

Well water is less subject to seasonal variations in supply and can more nearly be provided when needed, but still the supply may be limited and the cost considerably higher. Electric or fuel powered tubewells can, where groundwater supplies are adequate, provide a large supply. They have been widely adopted in northern India and Pakistan. Yet such wells may be even more expensive to operate and economically-sized units may be too large for the small farmer. Tubewells, however, may be used to supplement more traditional sources of irrigation water. And in some cases privately pumped water is sold to small growers. There is clear evidence that in some regions where tubewell irrigation is practiced the cropping index is higher than in canal irrigated regions.

The provision of irrigation water is, however, only one aspect of water control. Drainage is the other major factor. Adequate drainage is needed in the short run in order that proper aeration is provided; this is particularly important for crops like corn and vegetables. Over the longer run, proper drainage is needed to avoid chronic waterlogging of the soil or the buildup of salinization. These problems are well summarized by Walton: "With apparently unlimited supplies of water too much is applied to the fields and under conditions of poor drainage the groundwater table rises and formerly cultivated land is replaced by lakes and marsh, as in parts of the Nile Delta and in the Sind. Waterlogging is often accompanied by an increase of salts in the soils to levels which even the most salt-tolerant crops cannot withstand." These problems are most common with canal irrigation. The increased use of tubewells has made significant contributions toward overcoming them in large areas of Pakistan and northern India.

Fertilization needs. Except for regions where annual flooding takes place, fertilization is usually essential if multiple cropping is to be carried out over any extended period. The amount needed will vary with the

intensity of the rotation and the type of crop grown; regular inclusion of a legume crop, especially if it is plowed in, may actually restore nitrogen. Historically, fertility has been restored to the soil in many ways: through annual flooding, application of human or animal manure, or the use of dried fish or oil cakes. Some of these techniques can still be used, but the trend in the more developed regions is toward chemical fertilizers.

Little information is available on the nutritional needs of individual crops in a multiple cropping rotation. In India it has been suggested that in double cropping, one crop should be deep rooted and the other more shallow rooted so that different layers of the soils can be tapped for nutrients. It has also been noted that wheat and rice have a very complementary effect in the utilization of different forms of soil phosphorus. Recent research in India has also indicated that the new high-yielding varieties used in many rotations have a much higher requirement for micro-nutrients than do the traditional varieties. Much more needs to be known about the interrelationships between various rotations and fertilizer needs.

Insect, disease, and weed control. Multiple cropping provides a longer period of plant life which in turn is likely to lead to increased insect and disease problems. Moreover, some of the newer high-yielding varieties may be more susceptible to local diseases or insects than native varieties. In India, where multiple cropping has increased it is stated that "some diseases which were hitherto either unknown or only of local importance have assumed epidemic proportions." Reportedly in multiple cropping areas in Egypt, "army worms move from corn to sorghum and back again with the change in crops."

There are four possible solutions: (1) step up chemical control measures, (2) breed for natural plant resistance, (3) attempt biological control, or (4) arrange the rotations so that no two crops sharing the same pests and diseases are grown in sequence. The first three have particular difficulties and limitations: chemical control can be expensive and cause ecological problems; breeding and biological control take considerable time to develop. The fourth method, the proper arrangement of rotations, is a logical starting point but there may be limitations as to how much can be immediately accomplished.

Weed control, according to Bradfield, takes more time than any other operation in multiple cropping. Reduction of the fallow can shorten the period during which weeds grow unimpeded. On the other hand, in the irrigated rice paddy areas in southeast Asia, the traditional fallow during the dry season helps kill off aquatic weeds. Similarly, dryland weeds are killed by drowning in the wet stage. Thus a change in practice may increase the need to make use of chemical herbicides. But as Bradfield has noted, their use in a highly diversified cropping system becomes very complicated, especially if interplanting is practiced.

Post-harvest technology. Multiple cropping means that increased supplies of traditional or new crops will be available. This increases the load on existing storage and processing facilities or creates a need for new ones. Some of the early ripening rices, for instance, mature during a wet rather than dry season; this has led to the development and installation of drying facilities. Elsewhere, storage or transportation facilities may be overloaded or inappropriate for new products or patterns. New insect and disease problems may arise. Thus multiple cropping may necessitate new approaches to post-harvest handling.

Cropping sequences and yields. A fallow season has traditionally thought to have been necessary between crops because of the need to accumulate or build up water supplies and for the regeneration of soil fertility and structure. One of the main features of agricultural development is the reduction in the fallow period. For a variety of reasons it is difficult to say in advance whether the reduction of fallow involved in multiple cropping will lead to increased or decreased yields of individual crops. Even if yields drop, it is likely that total output of a piece of land per year will rise, which is the important factor.

Timing. As more crops are planted within a given season and the fallow period between them shortened, it is clear that less time is left between the harvest of one and the planting of the next. Minimizing the number of days the land is idle, while efficient in terms of land use, provides a special time burden. A large number of operations need to be carried out in a relatively short period of time. For rice these include: harvesting, threshing, drying, seedbed preparation (plowing, harrowing, puddling), initial irrigation, and planting or transplanting. Not just one farmer is involved; many farmers in a district may be trying to carry out the same operation at the same time.

Similar and simultaneous actions of many farmers can create a real problem in terms of input supplies such as seed, farm chemicals and irrigation. Multiple cropping not only increases the need for more of these inputs but makes more specific demands on when they must be available. In the new Sungei Muda irrigation project in West Malaysia, for example, it was feared that enormous timing troubles could arise from the servicing of many thousands of farmers simultaneously with inputs and other facilities. So they did; and it was subsequently necessary to rephase the program over longer periods of time. Tubewells help get around some of these problems because of their greater flexibility in time of operation, but they cannot be used everywhere and the cost of a unit may be too great for small growers.

The importance of a problem like irrigation timing would, of course, vary somewhat with the crop involved. It may well be most difficult in the case of rice double cropping where the paddy fields need to be levelled, flooded, and puddled prior to transplanting. To carry out field preparation operations in Kedah, West Malaysia, using water buffalo, for example,

requires 48 to 56 days and can only just be fitted into the present single cropping pattern. Such problems have led to increased interest in mechanization and early maturing varieties of rice. In the Malaysian case, mechanization cuts the field preparation time in half, but "the farmer is still faced with a very tight schedule allowing little for breakdown in machines or any other emergency." The availability of shorter-season varieties has stimulated consideration of direct seeding instead of transplanting (transplanting was often necessary in order to fit two crops into the available growing season); research work on a paddy seeder is underway at the International Rice Research Institute.

The length of growing season obviously has a major impact on the timing problem. Rice has a longer growing period than other grains or vegetables. Bradfield indicates that in the Philippines the better-yielding varieties now available require about 110 days to mature as compared to 75 to 90 days for crops like corn, soybeans, mungo beans and sweet potatoes, and 60 to 65 days for bush sitao and sweet corn. According to data provided by Lee for Taiwan, the growing period for three of four rice crops is 125 days each (the fourth, the first crop of native rice, requires only 100 days). Requirements for other crops ranged as follows: wheat 120, potato (winter) 110, tobacco 110, rape-seed 105, mustard 103, cabbage 98, Chinese cabbage 95, muskmelon 45. The exact growing period might well vary somewhat with the season involved. Thus the rotations can be arranged, within climatic restraints, to include crops which provide some flexibility on timing.

A number of other ways of reducing the timing problem have been used or are under investigation. Bradfield lists some of these:

Bed the soil to accelerate the drying of the top layer where crops are to be planted and cultivated;

Keep the volume of soil tilled and the number of tillage operations to a minimum;

Grow ratoon crops where feasible. This eliminates one or two planting operations;

Start slow growing vegetables in compact propagation beds and transplant to the field when they reach the period of more rapid growth.

Grow some crops each season which can be harvested and utilized in an immature stage (e. g. , sweet corn, edible soys).

Relay interplanting is another practice which is used in several countries in Asia. In Taiwan the practice involves planting a crop such as tobacco, jute, sweet potatoes, or sugar cane on small ridges formed by hand between the rows of paddy rice 10 to 20 days before the harvest. Another variation is the planting of sweet potatoes, peanuts, soybeans,

or rapeseed with sugar cane. A similar technique is followed in Madhya Pradesh State in India where linseed or pulse seed may be broadcast among standing rice plants about a month before the rice is harvested in November; the shade provided by the rice plants protects the seedlings from the hot October sun. A different system is followed in Bangladesh: two rices with different growing seasons are sown at the same time; the short season Aus varieties mature in 3 to 4 months, while Aman varieties continue to grow for 7-8 months. Other variants of these systems are undoubtedly practiced.

Even the best of systems, however, are subject to short-term vagaries of the weather. There is little margin in some rotations for delays caused by the weather. In the case of certain kharif crops in India, a delay of one week in sowing reportedly results in delaying maturity by two weeks or more. If a fixed harvest date is followed, a delay in maturity may lessen yield or create problems in harvesting or planting the following crop. Mechanization can help get around some of these difficulties. Timing will, however, long be a problem in multiple cropping.

Social and Economic Aspects

Multiple cropping is strongly influenced by a number of social and economic factors. Unfortunately even less work has been done in this sphere than on biological-physical aspects. Still, it is possible to outline some of the major questions which need to be asked and to review such information as seems to exist. We start by examining a key social area — the relationship of multiple cropping to population and employment. This sets the stage for a review of some of the key economic issues.

Examples of a correlation between multiple cropping and population density can be found successively at the international, national, and regional levels. For international comparisons, it may be appropriate to think of population density in terms of the amount of agricultural land per capita. The highest population densities are found in East and South Asia; multiple cropping is most prevalent in these regions. The lowest densities are found in Africa, Latin America and the Near East; with the exception of Egypt, multiple cropping is much less common in these areas. This relationship becomes even more evident when viewed on an individual country basis: among twenty of the most densely populated Asian nations, multiple cropping is found in all, though sometimes on a limited scale. Those countries with the greatest population density (except for Lebanon) generally have a high cropping index. No data are available for Thailand and Cambodia, but evidently multiple cropping is still limited. Only small areas are multiple cropped in Lebanon and Jordan.

The correlation between multiple cropping and population may also be evident within the regions of a nation. Based on some data reported in 1970 for East Pakistan (Bangladesh) for the early 1960s by Revelle and Thomas, a simple correlation was run between population density (in

terms of persons per acre on total land area) and cropping intensity for 15 provinces. The coefficient of correlation (R^2) was .61, which suggests more than a casual degree of association. Ganguli examined the relationships for a large number of Districts within the Gangetic Valley of India in the 1930s. He concluded that there was "a statistical correspondence between the high density of population and the extent of the double cropped area in the region." Ganguli went a significant step further in his analysis and considered the value of the second crop. When this was done he found "interesting regional contrasts which explain the variations in the distribution of rural density." Value would certainly merit attention as a measure of intensity and might well be tried in other studies.

Simple association or correlation in statistical terms is just that; it does not indicate direction of influence. Is it population density that stimulates multiple cropping, or vice versa? Could multiple cropping stimulate population growth? Or do both factors act on each other with the end result that both increase?

The main theme of a stimulating book by Ester Boserup (The Conditions of Agricultural Growth, 1965) is that "population increase leads to the adoption of more intensive systems of agriculture." There is some precedent for her observation: David Ricardo in 1821 noted the effect of population growth on land use in terms of a more intensive agriculture. Where the increase in population is even more rapid than in the England of Ricardo's day, and land even more scarce, the choice is clearer, as Ganguli found in his study of Ganges Valley. A Dutch agronomist, for example, reports that on densely populated Java, rice production could not keep step with the increase in population after 1900, necessitating increased multiple cropping.

The emergence of multiple cropping in response to these population pressures in turn means that more people can be fed. This is, in fact, often the main goal, but it also means that these additional people will survive to produce yet more children. A more abundant food supply, due in large part to multiple cropping, reportedly enabled China's population to begin to increase relatively rapidly at the beginning of the eleventh century. Thus there is reason for thinking that population growth and multiple cropping intertwine in an ever-increasing spiral.

Multiple cropping and employment. There are essentially three basic labor problems which involve the rural areas: (a) the need for additional total annual employment for landless laborers, (b) the need to reduce seasonal unemployment for those involved in agriculture, and (c) the need for additional labor at key peak periods (such as planting and harvesting) in some regions. In solving (a) and (b), the purpose, of course, would be to increase labor income. The three problems are not entirely mutually compatible in terms of solutions, but multiple cropping can, under certain conditions, make contributions to each.

While there is good reason for thinking that total labor use is increased with multiple cropping, only limited empirical evidence is available. In Taiwan, the increase in labor input per hectare during this century has shown an amazingly close relationship with the increase in multiple cropping. This is illustrated by the following indexes of change:

	<u>Multiple Cropping</u>	<u>Labor Input</u>
1911-1915	100	100
1931-1935	113	114
1956-1960	156	155

Data of a much more limited nature, representing a sample of progressive farmers in the Punjab during the late 1960s, showed an even sharper increase in labor requirements with an increase in the intensity of cropping. Similarly, a study in the Bicol region of the Philippines in 1968-69 revealed that "in general, the labor input increases as the multiple cropping index increases on both lowland and upland palay (rice) — diversified farms."

The impact of multiple cropping on employment will fluctuate with the intensity of cropping. Intensity of cropping, in turn, is related to the type of water supply, crops varieties, and cropping frequencies. We do not have sufficient information on these matters, but perhaps the following references will be illustrative: The type of water supply can directly affect labor needs and indirectly influence them through the intensity of cropping. The irrigation process itself requires labor; systems involving wells and tanks (ponds) may require more labor than those involving tubewells or canals. The type of crop is clearly important.

Labor requirements for individual crops vary over a wide range, as is illustrated by the statistics for Taiwan in Table 3. Similar data for 11 crops in Central Luzon in the Philippines show a range in requirements from 28 days per hectare for corn to 417 days for onions.

The improved varieties of grain, especially rice, may require more labor per unit of area, though not per unit of output, than traditional varieties. In one study in the Philippines, the labor requirements were about 20% higher for high-yielding rice varieties where high quality irrigation was available (they were little different under rainfed or low quality irrigation condition); the difference was due to the greater weeding and harvesting and threshing requirements. In another study on 42 rice farms in Laguna, the requirements were about 8% higher, principally due to harvesting and threshing labor needs. Improved varieties may also differ among themselves in their labor requirements. While one survey in the Philippines revealed that IR-8 rice required only slightly more labor per hectare than BPI-76, another survey in the Thanjavur area of India indicated that an acre of IR-8 required approximately 40%

more labor than an acre of ADT-27. If yields are taken into consideration, the differences may be less.

Table 3 — Labor Requirements for Individual Crops, Taiwan

Crop	Number of Man Days
Potato (fall)	78
Rapeseed	80
Wheat	97
Ricel	98-103
Potato (winter)	106
Peanut	107
Sugarcane (fall)	145
Muskmelon	172
Mustard	207
Cabbage	256
Cabbage, Chinese	354
Tobacco	800

¹ Native 2nd crop 98; native 1st crop 99; ponlai 2nd crop 100; ponlai 1st crop 103.

SOURCE: — T. H. Lee, "Agricultural Diversification and Development," SEADAG Paper No. 71-2 (The Asia Society, New York) p. 10.

The range in labor requirements is widened as one moves from single to double, from double to triple, and from triple to quadruple cropping. Unfortunately data on actual hours of labor used (as opposed to cost of labor) seem to be very scarce, particularly with respect to the move from single to double cropping. In Chekiang Province in China in the mid-1950s, the change from single to double cropping of rice increased the demand for labor by 80%. The labor requirements for triple cropping were up to two to three times greater than for double cropping in Taiwan, depending on which of several types of rotations are involved. Quadruple cropping is likely to raise the lower end of this range, but is doubtful that the upper limit is raised much except in cases of very intensive vegetable culture.

It is not certain just how much of the increased labor required by multiple cropping would be allocated between (1) a net expansion in jobs, and/or (2) a reduction in unemployment of existing farm labor. Experience in Pakistan and Taiwan indicates that an increase in multiple cropping has led to a less than comparable increase in the farm labor force, suggesting a substantial degree of previous underemployment. The situation may vary with type of operator: further production may be unattractive to large operators who hire laborers, but may still be considered desirable to small farmers who do all their own

labor. Lee has indicated that the small-scale farmers on Taiwan "have adopted labor-intensive cropping in order to absorb more family labor."

Severe underemployment may indeed exist on family farms much of the year. Farm management studies in India have shown that nearly a quarter of the family labor engaged in traditional farming is not gainfully employed because farm operations are not spread over the year (similarly, bullocks are not used for any operations over half of the time). Increased multiple cropping can clearly contribute to shortening slack periods during the year (in turn leading to increased farm income).

At the same time, however, multiple cropping is bound to exacerbate seasonal labor shortages at planting or harvesting time. Multiple cropping in the Thanjavur area of India has led to 60% increase in labor demands over a short period. Labor costs at such periods, especially in fertile areas such as the Punjab, are already commonly much higher than during other portions of the year. Moreover, there can be an actual shortage; Perkins reports that for several provinces in China, "...the available labor supply is on the average less than half that necessary for ideal double cropping conditions." Labor shortages, in part due to industrial development, have contributed to a drop-off in multiple cropping in Japan and Taiwan.

The problem of seasonal peaks in labor demand could be alleviated by steps which would (a) lengthen the amount of time available during the planting or harvesting period, or (b) speed up these processes. Some of these techniques have already been discussed. To accelerate operations, mechanization has often been used or suggested. As Heady and Agrawal put it, by speeding critical operations such as land preparation, harvesting or threshing, mechanization can allow addition of a crop which lessens the underemployment of labor in other seasons and provides a more stable employment over the year. A recent analysis in the Punjab area in India suggests that "tractors do influence the intensity of cropping and thereby increase the requirements of labor." Other data also suggest an increase in tractor use with increased multiple cropping. Some economists feel that mechanization may only be justified in a social sense in terms of the impetus it may give to multiple cropping. Still, this relationship may not hold in every area. Moreover, it will be difficult to limit the use of machinery on other labor-intensive operations at other times of the year.

In sum, it appears that multiple cropping can make significant — if not yet fully quantified — contributions to increasing farm employment. Indeed, Heady and Agrawal have suggested that for the next two decades, "multiple cropping promises to be a more effective means of creating employment for the growing and already large population in rural areas than does the prospect of industry" in India. But to make all of this possible,

ways may have to be found to help get around problems of seasonal labor shortages without contributing to an eventual weakening of the employment situation the remainder of the year.

Is multiple cropping the best social use of resource? The increased costs of multiple cropping must be evaluated against increased returns. Government planners will be concerned with whether multiple cropping is the most productive use of scarce resources. If single cropping is the prevailing system, the initial question is whether it is desirable or worthwhile to try to produce additional crops. Would it be better for the government to devote scarce public resources exclusively to expanding production under the present system or to devote part of them to encouraging the culture of a second or third crop? While we will pose the question in terms of economics, it must be recognized that actual government policy may be influenced by a number of other factors. Among the basic factors in assessing the desirability of multiple cropping, aside from its effect on employment, might be its potential effects on: (1) quantity, quality and price of food to the consumer, (2) income distribution between small and large farms, (3) foreign exchange costs, and (4) utilization of human resources.

It is a goal of nearly every government to make more and nutritionally better foods available to consumers at a lower price. Multiple cropping holds definite promise of expanding total agricultural output and of making it possible to grow a wider variety of crops. Expanded output can help meet caloric needs. The potentially increased variety could include crops which provide a better nutritional balance. In each case, the expanded output should lead to lower consumer prices. The critical factor in all of this, however, is whether sufficient effective consumer demand is present to keep farm prices at a level which will stimulate production. If not, the government may have to — as it usually does — step in with some sort of purchase and welfare program. The presence of a new second or third crop, therefore, can disturb existing price support and purchase programs. Consequently, the evolution of a whole new series of competitive and complementary relationships, means, as Gotsch and Falcon note, that price policy must be considered in a multicrop, general equilibrium setting.

The small farmer is often bypassed in the course of technological progress, further widening existing economic gaps. Multiple cropping, in contrast, has evidently been as readily adopted on small as large farms. Massive surveys in Mainland China in the 1920s and 1930s revealed no significant relation between farm size and degree of multiple cropping. If there is a relation, it may be that smaller farmers

have a higher cropping index. This, in fact, has recently been indicated in studies in India, Bangladesh, Pakistan, Korea, and the Philippines.

The foreign exchange costs of multiple cropping as compared to alternative agricultural programs are unclear at this point. Nearly all production programs require increased inputs of farm chemicals and improved water control. If these inputs must be imported, then most any program will involve a foreign exchange cost. Multiple cropping might, however, have particularly great requirements for fertilizer and irrigation (and hence irrigation equipment). The matter bears further investigation.

Multiple cropping, as was suggested in the previous chapter, also requires a great deal of scientific, technological and administrative know-how. These are among the scarcest of items in less developed nations. Moreover they can be costly. Will their investment in multiple cropping pay higher dividends than elsewhere? One might like to think so, but it would be difficult to be certain.

Where do we come out? Multiple cropping, from a social point of view, appears to hold promise of: improving employment, reducing rural income disparities, and expanding the quantity and quality of output. On the other hand, multiple cropping may increase foreign exchange cost for certain inputs, and increase the demands on scarce human administrative and scientific skills. On balance, multiple cropping appears to be a most promising use of resources. The question of whether multiple cropping is the best use of resources in agriculture is of more than theoretical concern in some nations. In Pakistan, the World Bank has studied the question of whether to use limited water resources to extend the total irrigated area or to make more intensive use of existing irrigated lands through multiple cropping. According to its report, the Bank's recommendation was to "... intensify cropping on a 30 million acre land base over the Perspective Plan period (1965-85) rather than to expand total irrigated area."

In Thailand, there has been a recent debate over whether it would be better to use limited resources on expanding the output of the main rice crop or to use part of them to produce a second crop. With the completion of the Phumiphon Dam, some sections of the Thai Government, the Ministry of Interior in particular, were anxious to promote as much double cropping of rice as possible. The Department of Rice, on the other hand, was reported believing that the same resources could produce more rice if they were concentrated on one main crop.

In Bangladesh, the water supply situation is somewhat different from Thailand. Much of the land is flooded annually and adequate residual moisture is left for a winter (rabi) crop. Yet there is not enough moisture for the traditional crop of East Pakistan, rice. Thus despite a favorable climatic situation and an extremely dense population, much of the

potentially arable land is let go fallow. One potentially strong prospect is expanded potato production. The key problems seemed to be lack of technical know-how, inappropriate seed stock, and lack of seed storage facilities. All could be solved, but they would require both scarce technological and capital resources. The economics of government investment in multiple cropping vis-a-vis other alternative programs in agriculture, therefore, are a real question and will undoubtedly be of increasing concern in the future. Unfortunately, financial data on the costs and returns to multiple cropping appear to be very limited. Thus the few studies reported here are only illustrative; I have no idea if they are widely representative.

The extent to which costs of raising a second crop will raise total costs will depend in part on the degree to which underutilized resources are present. If sufficiently well-watered land is available, there is an adequate growing season, and draught animals and labor are unemployed or underemployed, costs will be lower than they otherwise might be. But if, for instance, planting and harvesting dates overlap, and harvest labor is already short, labor costs could be extremely high and would lead to the need for mechanization; mechanization in turn might lower the per unit cost but could require extensive capitalization which would be out of the reach of many farmers. Water supply could be a particular problem; reliance on artificial supplies of any kind — but particularly pumps — is bound to be more expensive than rainfall.

We have noted the increase in labor normally required as a shift is made from single to double cropping, and from double cropping to higher multiples. We have also noted that labor requirements vary according to the types of crops included in the rotations. The increases in labor costs involved in moving from single to double cropping, and from double cropping to higher frequencies, are indicated in data from the Philippines (Table 4) and Taiwan (Table 5). Similarly, other studies have shown the wide variations in labor costs among different cropping frequencies.

It is not certain, however, whether the labor costs increase directly with labor requirements. The answer depends on the degree to which hired or family labor is utilized. This in turn depends in part on the degree of underemployment of family labor and on the amount and timing of labor needs by individual crop rotations. For example, of the total amount of labor required for 12 different double cropping rotations in Central Luzon, the proportion of hired labor utilized varied from 52.5% to 32.3%. Hired labor requirements were particularly high for rotations involving two crops of rice; this was because the pulling of seedlings and the transplanting were done on a contract basis. Hence labor costs cannot be imputed directly from labor requirements. It is not clear from these studies what kind of price was attributed to family labor.

Capital costs also vary widely. In a recent Philippine study, rice double cropping involved less capital than diversified single cropping, while double cropping involving a second crop other than rice required 45% more capital (Table 4). The Taiwan study revealed a sharp jump in capital costs in moving from double to triple cropping, but no further change involved in moving from triple to quadruple cropping (Table 5). In other studies, the range is wide. For six rotations in Taiwan, the range was from an index of 100 to a high of 284. For ten triple cropping rotations in India, the range was from an index of 100 to 196.

While the data are not entirely consistent, it seems clear that multiple cropping, especially of the more intensive forms, brings about an increase in both labor and capital costs. Labor costs are perhaps of primary concern to larger growers, while capital costs may be a greater problem to small growers who have more difficulty in obtaining credit.

Table 4 — Costs and Returns Under Three Cropping System,
Bicol, Philippines, 1968-1969

Cropping Index	Cropping System	Number of farms	Labor (mandays)	Operating Capital(P) ¹	Net Return(P) ²
				-per hectare-	
100	Lowland rice diversified	24	185	93	698
200	Lowland rice - lowland rice	46	200	73	662
200	Lowland rice - other crops ³	32	263	135	1060

¹In Philippine pesos. Includes all variable costs except wages for hired labor and value of shares for harvesting and threshing services.

²In Philippine pesos. Return above variable costs (which include expenses for fertilizers, insecticides, wages of hired labor and value of shares for harvesting and threshing).

³Include vegetables such as cabbage and tomatoes.

SOURCE: — "Annual Research Review: Agricultural Economics," International Rice Research Institute, February 9, 1971, p. 2, table 17.

The returns from multiple cropping, as might be expected, are highly variable. Two of the more prominent factors may be (1) frequency of cropping, and (2) type of crops included in a given frequency.

Table 5 — Indexes of Costs and Returns Under Three Intensities of Multiple Cropping, Taiwan, 1965

Cropping Index	Rotation	Index of Cost			Index of Returns	
		Labor	Capital ¹	Total	Gross	Net
200	rice — rice	100	100	100	100	100
300	rice — rice vegetable	163	158	160	158	156
400	rice — vegetable — rice — vegetable	184	158	170	185	206

¹Seed, fertilizer, animal or machinery, pesticide, and other.

SOURCE: — Chien-pan Cheng, "Multiple Cropping Practiced on Paddy Field in Taiwan," Joint Commission on Rural Reconstruction, April 8, 1970, p. 10 (Based on "Report on Economic Survey of Land Utilization and Crops Production in Taiwan," JCRR Special Report No. 42, 1965).

While some increase in net returns might be expected in moving from single to double cropping, the progression is not always an even one. For instance in the Philippine study noted previously (Table 4), the returns from double cropping were higher than for single cropping only when the second crop was other than rice (in which case they were 52% higher). In another Philippine study the average returns moved as follows on a small number of farms growing rice and other crops:

Type of Rice	Average Cropping Index	Index of Returns Above Variable Costs per Hectare
Lowland (27 farms)	103	100
	147	432
	182	243
	205	584
Upland (23 farms)	100	100
	125	128
	155	52
	200	180

Returns initially increased, and then dropped off before climbing again.

Generally, however, these and some other studies reveal a tendency for net returns to increase with cropping frequency. In Taiwan, when the returns for double cropping were set at 100, the index of net returns for

the triple cropping was 156, while the index for quadruple cropping was 206 (Table 5). Similarly, in another study in India the data showed the following progression:

Cropping Index	Rotation	Net Returns (index)
100	rice — fallow	100
200	rice — wheat	200
300	rice — wheat — moong	297
400	maize — potato — wheat — moong	382

Just how representative these statistics are is not certain.

Beyond variability, there are several other problems in interpreting net return calculations. First, only the better farmers may attempt the more complicated cropping practices, so that the increased return is in part a function of management skill. Secondly, the effect of an increase in production (from adoption of a new cropping system) on price is usually not determined. This is an important constraint because the total market for some products is not large and expanded production may bring about sharp price drops. Thirdly, net returns may not be defined the same way in every study. And with the great variability in tenure arrangements, it may be difficult to settle on a common meaning. For these reasons, returns data may often be suspect.

Another basic point is that even with more intensive rotations, overall returns to farmers may still be low compared to the rest of society. And in some cases where average farm size holding is very small, it may be necessary for the operators to move to the higher rotations just to maintain a minimal income. For these individuals, multiple cropping is a last chance, not a step into affluence.

Factors Retarding Or Influencing Adoption

Alfred Marshall once stated that the switch to more remunerative crops might be "retarded by habit, or diffidence, or obstinacy, or limitations of the cultivator's knowledge; or by the terms of his lease." This list is remarkably appropriate for multiple cropping. Perhaps the factor most readily understood is that multiple cropping, despite its promise of higher returns, means more work on the part of the farm operator. Some farmers may not feel the added returns are worth it. The interest in leisure may stem from other than personal inclination; it may be due in part to a debilitating climate, health problems such as parasites which sap energy, and inadequate diets.

Multiple cropping not only may cause a significant change in the accustomed rhythm of life, as Myrdal puts it, but the change in cropping

patterns may run afoul of some unexpected customs. Johnson, for instance, reports that rice is the prestige crop in much of India, both for production and consumption, and that a change to coarser grains may be resisted. Also in India, it has been the practice in many villages to let cattle range over land fallowed in the off-season. If crops are to be grown on part of this former grazing area, cattle will have to be excluded.

Another problem may be presented by water and rent charges. In one area in India, it was found that multiple cropping was more apt to be practiced where the rent was fixed for a piece of land for the year (presumably on the basis of a single crop) than where it represented a share of the output. Alternately, some landlords will charge the same rent for land which is used for a second crop even though the yields may be lower. Much the same is true of irrigation charges. In the Comilla area of Bangladesh, Haswell reports that the system of imposing water charges in no way reflects the economic cost of producing various crops under irrigation in the dry season.

Other reasons for not taking up multiple cropping are varied. Some which were noted in India were: bird problems (it was necessary to man a watch for the crop from daybreak to sunset for at least a month); lack of time on the part of small farmers with other jobs; shortage of labor on larger farms; shortage of bullocks on smaller farms; less acceptability and lower prices for the second crop; and reduction of first crop when double cropping was practiced. Rats have been a negative factor in the Philippines: in three rice regions during the 1967-68 season, the area planted to a second crop on farms with a rat problem was half that on farms with no rat problem.

Clearly the social and economic aspects of multiple cropping are no less complicated than the biological and physical aspects. Three major points have been outlined: the relation of multiple cropping to population and employment, basic economic questions, and factors influencing or retarding adoption. Each is complicated enough by itself. But each also intertwines with the other, making analysis that much more difficult. And other issues and factors could undoubtedly be added. The economic and social aspects of multiple cropping provide no shortage of challenges for further study.

Prospects

Multiple cropping is now the subject of increased interest. New early-maturing varieties, and associated inputs, have made it technically possible to increase the number of crops planted per year. Continued population growth and increases in income provide a demand for an expanded and (to some extent) more varied output. Concurrently, there has been a growing concern with the employment problem in

rural areas as well as the need to improve the incomes of small farmers. Multiple cropping does increase the need for labor over the course of the year, though just how much is uncertain. And in many cases it can be carried out as well — or better — by small growers with underemployed family labor. There are, therefore, strong reasons why less developed nations may wish to take a close look at multiple cropping.

A vast array of factors influence the prospects for multiple cropping. But some regions or countries can clearly be eliminated as prospects because of unfavorable climate or other biological or physical limitations. In some cases these problems can be overcome, but at considerable cost; in these areas multiple cropping may long remain a marginal question. For other nations or regions more fortunately situated, the time may not yet be quite at hand because of the need to improve water supply, the lack of adequate seasonal labor, or inadequate demand. But for still others the time may well be ripe for an expansion of multiple cropping.

Multiple cropping will doubtless grow in importance in the future. But so many interrelated factors are involved in multiple cropping that it would be very difficult to make any very precise projections of the potential multiple cropped area. Still, two general estimates as to the maximum global potential and possible shifts by continent have recently been prepared which may be of interest.

In the President's Science Advisory Committee (PSAC) report in 1967 on the World Food Problem, the subcommittee on water and land estimated that multiple cropping could in effect ultimately expand the world's potentially arable land from 7.9 billion acres on a single cropping basis to the equivalent of 16.3 billion acres, more than double. Of this 8.5 billion acre increase, only about 2 billion could take place in the absence of irrigation; attainment of the other 6.5 billion acres would require irrigation. These figures represent the outer limits of a theoretical potential which it would be virtually impossible to reach in practice.

FAO's recent Indicative World Plan for the 1970s acknowledged that, while the potential for multiple cropping seems to be considerable, they don't expect it to assume major significance outside certain Asian and Near East countries before 1980. If suitable preparatory research is now begun, they feel that it could become "a major contributory factor to growth after that year in all developing regions where ecological conditions are suitable." It is noted that multiple cropping could be of special significance in obtaining high financial returns from new investments in irrigation projects in Latin America and Africa south of the Sahara, even though population pressures on land would not render its general adoption as urgent as elsewhere.

From what we have seen, multiple cropping is usually a more complex process than traditional agricultural methods. It normally requires a relatively high degree of technical and management knowledge, an assured water supply, increased production inputs such as fertilizer and pesticides, and a more sophisticated marketing system. These ingredients are not available in great abundance in many nations, and are particularly scarce in the less developed nations. Therefore, climate permitting, the process technically might well be more easily adopted in the more advanced nations.

Other factors reinforce this point. Profitability to the farmer is a key item. For commercial multiple cropping to pay off, desire for the product must be backed up with the ability to pay for it at prices which will encourage production. Effective demand is apt to be greater in the more developed nations. The demand, potential or real, will likely vary for different types of product. The lowest income groups may be glad to settle for basic food grains; their problem is to secure sufficient calories. The higher income groups, who already have access to grains, demand fruits and vegetables and dairy products. The question facing the planner is to determine which income group he should try to reach, or to decide how to balance the emphasis between the two groups. Since low income groups might not have the purchasing power to buy additional grain even if it came on the market, a government purchase and distribution program could be necessary to encourage sharply increase monoculture involving grain crops. The existing price for fruits and vegetables might well be adequate, but the market may be thin — there are only a limited number of people able or willing to pay the price; the more highly developed the economy, the broader this group will be.

The prospects for multiple cropping will also be conditioned by marketing patterns. Much of the motivating force for multiple cropping will probably come from the desire to sell the extra production for cash. Where the additional crop is the same as the basic crop (monoculture), relatively few changes in marketing practices may be necessary except those brought about by an increase in or a change in timing (such as the need to dry rice which may mature during the wet season). Where different crops are to be produced, considerable changes may be necessary. In either case, greater modifications will be necessary if there is an intention to find an export market.

The government may well find that it will need to adjust its price support and purchase programs, which generally include only basic grains, if it wants to encourage production of other crops. The support prices for wheat in India and Pakistan, for instance, are

high by world standards and may provide a disincentive to produce other crops. But lowering them may not be enough; some kind of guaranteed price program may be necessary at first to stimulate production of other crops.

[Extracted from Survey of Multiple Cropping in Less Developed Countries, Foreign Agricultural Economic Report No. 91, October 1971. Chapter 1, 3, 4, and 6. Washington, D. C.: Economic Research Service of the U. S. Department of Agriculture in cooperation with the U. S. Agency for International Development.]

Current Research in Multiple Cropping

Carroll P. Streeter

[This article describes some of the most successful experiences with multiple cropping, first in the practices of farmers in Taiwan, and then in the experimental work in the Philippines and India. A five-crop annual sequence is explained.]

In Taiwan, the heavy concentration of people in a limited land area has produced an agricultural phenomenon: never have I seen more intensive use of land. Not only is every bit of crop space used laterally, but as far as possible it is used vertically as well. For example, A-shaped trellises span irrigation and drainage ditches too deep for rice, and cucumbers are grown in the space over the water. Vegetables are planted under the branches of young fruit trees. Grapes hang in profusion from a wire latticework five or six feet above ground but by no means are they allowed to occupy the ground alone. In the winter when the grape leaves drop off, letting the sunshine through, a bountiful crop of staked-up tomatoes, cabbages, or some other vegetable comes on. Two crops of rice a year are standard in Taiwan, one from early March to early July, the other from early August to November. That leaves a span of forty days between the crops in summer and ninety days in winter. But the fields are never empty; vegetables take over both times.

It might seem impossible to grow jute, which needs 120 days to mature, in the forty summer days between rice crops. But some farmers in Taiwan do it by letting the plants spend their first forty days in a separate small seedling bed. During the second forty days it is

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interplanted in the summer rice crop. The last forty days, after the rice is harvested, it grows on the field alone, shooting up to a height of ten or twelve feet before it is hustled off to make way for the next rice crop. It has had its full 120 days, although it occupied the field alone for only forty.

Taiwan probably raises more food per acre than any other place in the world. As a consequence her small farmers eat very well themselves, buy what they need from their cash marketings, supply city people with a good diet, and provide the nation with substantial agricultural exports. The island now produces a surplus of rice and winter vegetables, so many small farmers are turning to other crops — mushrooms, bananas, litchinuts, citrus fruits, pineapples, guava, hogs, poultry, and pond-grown fish — anything that commands a good price. Sizable quantities of wheat, soybeans, and feed grains must be imported, but of the other crops and livestock that can be grown under intensive methods she has more than enough.

The small farmers of Taiwan are experts at the technique of raising three, four, or even five crops a year on the same ground. This practice uses to the fullest the advantages of the tropics — a twelve-month growing season and more heat and solar energy than ever reach the temperate zones. The Chinese and South Asians have been multiple-cropping for a thousand years, but the extent to which it has been carried in postwar Taiwan is new. What is responsible for the recent phenomenal gains in output is new technology: new short-season varieties of rice, wheat, and other crops; ingenious systems for overlapping planting and harvesting dates to exploit land and sunshine to the utmost; and the proper use of fertilizers, insecticides, and other chemicals.

Experimental Results at IRRI

At the International Rice Research Institute (IRRI) in the Philippines, Dr. Richard Bradfield of the Rockefeller Foundation has developed new multiple-cropping systems, and is teaching them to trainees from all over Asia. As a result, new versions of the ancient multiple-cropping method should be spread through tropical Asia in the next few years.

Bradfield concentrates on five crops — rice, grain sorghum, soybeans, sweet potatoes, and sweet corn. Each has an excellent reason for being in his program. "In Asia," he explained, "you must talk to a farmer about his rice before you can discuss anything else. It is the best-adapted crop in a monsoon country where 60 to 120 inches of rain may fall within three or four months. More people in the world eat rice than any other grain."

Grain sorghum follows only rice and wheat as the world's most important human food. Both the grain and the stalks make an excellent

livestock feed as well. The crop has two special merits: first, it is a good dry-land crop because it is resistant to periodic droughts; second, it ratoons — that is, after a crop is harvested a second, sometimes even a third crop will spring up from the stubble. These harvests are often as good as the first.

Soybeans put protein in the rotation. They contain more protein than any other crop. From the ripe beans processors make soy milk, soy flour, meat substitutes, and a variety of soybean oil derivatives. Soybean meal makes a fine protein food for livestock and poultry, or the pods can be harvested green for a food widely appreciated by Asians.

Sweet potatoes not only yield big tonnage and supply bountiful calories but are especially rich in Vitamin A. "There are said to be a hundred thousand children in the Philippines who have gone blind from lack of Vitamin A," said Bradfield. "Yet one sweet potato a week would provide a child with all the Vitamin A he needs." Sweet corn is the most profitable crop of the five. "We can sell all we can raise, right out of the field," Bradfield told me.

From this five-crop rotation Bradfield gets two to four metric tons of rice per acre (0.4 hectares equals one acre), ten tons of sweet potatoes, and one ton of soybeans — these three alone totaling thirteen tons — plus eighteen thousand ears of sweet corn and three tons of green soybean pods. This rotation is valuable nutritionally. Philippine standards call for 2,600 calories and 55 grams of protein per man per day. On that basis one of his acres would provide enough calories in a year for twenty-nine men and enough protein for fifty-three.

Bradfield, of course, can achieve these high yields partly because he can have all the water, fertilizer, pesticides, herbicides, machinery, and labor he wants. The best scientific knowledge and control of operations are applied. But many Asian farmers could do at least half as well; and those without irrigation but with forty inches or more of rainfall could do one-third as well. What this could mean is shown by Bradfield's estimate that if every farmer in Asia provided for his own family and one other, the continent would have a 40 percent surplus of food.

The technical package. To raise five crops a year a farmer must do several things:

— Choose short-season varieties. For example, Bradfield uses a rice that matures in about 100 days, while most rice requires 120 to 150.

— Interplant crops. A month or so before one is harvested the next is planted between the rows. Interplanting requires that the crops be compatible. Starting a short-season crop like sweet corn with a slow-starting one like sweet potatoes, for example, will conserve space and sunlight, since the fast grower will mature and be taken off by the time the slow starter is well underway. It is also good to grow deep-rooted and shallow-rooted crops together, to avoid varieties that sprawl excessively, and to avoid planting two crops in succession that are subject to attack by the same insects and diseases.

— Harvest some crops before they mature — sweet corn and green-pod soybeans, for example.

— Include a crop that will ratoon, such as grain sorghum, and get two or three harvests from one sowing.

— Fertilize adequately. Soils that work all year must be well fed.

— Spray as often as necessary. With so much vegetation growing, insects flourish.

— Minimize the tillage operations on each crop and use small power machinery for as many of them as possible. Bradfield uses a six-horsepower walking tractor to complete the work rapidly and on schedule. "Any multiple-cropping farmer with as little as five irrigated acres could pay for one in two or three years out of the extra crops he would raise," Bradfield says.

In trying to cut down the tillage operations with rice, Bradfield is challenging centuries-old methods practiced in much of Asia. Farmers commonly plow a field several times while it is under water, slogging behind a water buffalo. The theory is that this plowing "puddles" the soil to make it hold water better. Then the farmers transplant rice from seed beds to the flooded paddy, handling one plant at a time — an operation that requires a tremendous amount of stoop labor. But by keeping water on the field farmers hold down weed growth, and weeds are a tremendous problem in the tropics.

Bradfield and some of his associates at IRRI concede that puddling may be necessary in light, sandy soils that otherwise won't hold water. But they believe that on heavier soils rice can be sown much more easily and quickly on dry land with a drill — the field to be flooded later by irrigation or rainwater. Weeds could be sprayed out with chemicals. This is the way rice is grown in the United States, as well as in Australia which has the highest per-acre yields in the world. "One trouble with puddling in nonirrigated regions," Bradfield says, "is that a farmer has to wait until he gets five or six inches of rain within forty-eight hours.

He may wait two or three months for that. Meanwhile, he could raise an additional crop of something. "

The timetable. Figure 1 shows how the Bradfield team manages to schedule its five crops in one year. The total of growing days is 416, yet they are all crowded into one year thanks to intercropping. With a slightly different rotation Bradfield has actually farmed the equivalent of 450 days a year.

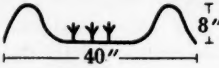

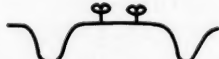
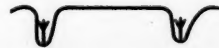

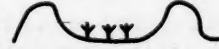
His simplest pattern consists of only rice and grain sorghum. On a field shaped in cross-section like Numbers 1 and 2 in Figure 1, the rice goes in the flooded middles. Two rows of sorghum are planted on the ridges as soon after the rice harvest as possible, usually about October 1st. The first crop of sorghum is taken off eighty-five days later, about Christmas. Then the ridges are fertilized with fifty pounds of nitrogen per acre, the weeds are cleaned out and the field is irrigated if necessary. No new seeding is required. The first ratoon crop of sorghum comes off March 10th to 15th. The field is again fertilized, weeded and irrigated, and the second ratoon crop is harvested about May 25th — the third crop from one sowing — just in time to seed rice again. The best yield so far has been 23,100 pounds of grain per acre (5,000 of rice and 18,100 of sorghum), or a little better than ten metric tons per acre.

In rain-fed areas of Asia many farmers settle for one rice crop a year and nothing else. Much of the time their little paddies stand dry and weedy, growing nothing. Bradfield is showing how to substitute grain sorghum for weeds and get at least one sorghum crop on the moisture left by the rice cultivation. With timely rainfall it is sometimes possible to get a ratoon crop as well.

Bradfield explained how he had divided his fields into twelve plots and raised four or five crops a year on each. This let him harvest something about once a week. He added: "I believe we could add livestock to this picture, putting meat, milk, and eggs within reach of a lot of people who are going without right now. Some of my economist friends scoff at that. They say, 'you know as well as anybody that it takes several pounds of grain to make a pound of meat and that Asia can't afford this. It has to have the grain for people, not animals.' What they forget is that half a crop is made up of stalks and vines and leaves that people can't eat but that animals can. At IRRI we've produced more than ten tons of good green forage per acre, in addition to all the grain and vegetables we've taken off. If we're not going to waste all this we will have to have animals to convert it into something people can eat.

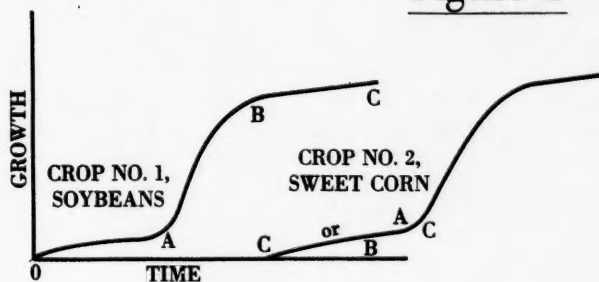
"More farmers over here ought to have a small pond or reservoir to save some of the monsoon water. If it were deep it wouldn't take

Figure 1: Intercropping System

Crop	Date of Planting	Date of Harvest	No. Days in Growing Season	Tillage Operations
1. Rice	June 1	Sept. 10	102	 <p>Field is shaped as shown, with depressed middles and ridges forty inches apart. The rice is sown with soybeans (no. 5 below) four weeks before the beans are harvested. Later the rice will be flooded.</p>
2. Sweet potatoes	Aug. 25	Dec. 5	102	 <p>Rice middles are drained and sweet potatoes planted on ridges three to four weeks before the rice is harvested.</p>
3. Soybeans for grain	Dec. 22	March 17	85	 <p>The depressed middle, which raised the rice in no. 1 above, has now been elevated. The ridges that raised sweet potatoes (no. 2 above) have become furrows. This is a simple tillage job.</p>
4. Sweet Corn	March 1	May 5	65	 <p>Corn is interplanted in soybeans (no. 3) two to three weeks before beans are harvested. Furrows have been fertilized and irrigated for corn and will later be filled in as corn is hilled, forming ridges for the soybeans (no. 5) to follow. Soil for this comes from the middle, which is again depressed in the process.</p>
5. Soybeans for green pods	May 1	July 1	62	 <p>Interplanted in sweet corn a few days before the corn is removed.</p>  <p>Sow rice again June 1, about a month before the soybeans (no. 5) come off, and repeat the cycle.</p> <p>The secret of intercropping, or growing two crops at once, is in handling their slow-growth period. Most crops start off slowly, then have a period of rapid growth, then slow down again toward maturity. The trick is to overlap the slow growth toward the end of one crop with the slow starting period of the next. The growth curve in Figure 2 illustrates:</p>

much land. They could put a few head of livestock right along-side the pond so the manure could run into it — the kind of manure lagoons a lot of farmers in the United States now have. The manure could fertilize the algae in the pond and help them grow at least a ton of fish per acre, and the manure wouldn't hurt the fish for eating. The overflow water could irrigate a bit of land, carrying a little soluble fertilizer with it. Such a simple setup could be a regular little protein factory. "

Figure 2



Crop no. 1 (soybeans) grows slowly from O to A, then spurts rapidly to B, slowing off to C at maturity.

Crop no. 2 (sweet corn) starts slowly from B to C, overlapping the slow growth period of the soybeans.

Multiple-Cropping in India

India is now trying for a new breakthrough in production through multiple-cropping. By 1966/67 her farmers were double-cropping 14 percent of the cultivated land. Since then they have sharply increased such acreage, thanks largely to the appearance of new short-season varieties that allow more crops to be squeezed into a year. Wheat, for example, has become an important crop for the first time in four of the most densely populated states of east India — West Bengal, Assam, Orissa, and Bihar — because new short-season varieties of rice are harvested there by October, in time to sow wheat, instead of in January as before. Bihar has tripled its wheat acreage in the last three years while raising as much rice as ever, and West Bengal had 800,000 acres of wheat in 1971 although it had practically none the year before. In the state of Maharashtra in western India, farmers with at least 100,000 acres whose only crop had been cotton now get an additional crop of soybeans.

India has a vigorous new multiple-cropping drive in motion under the direction of Dr. Akrim Singh Cheema, Agriculture Commissioner

in the Ministry of Food and Agriculture. Today there are fifty-one multiple-cropping demonstration projects under way in various parts of the country. Some of the most exciting research is being done at the Indian Agricultural Research Institute (IARI) outside New Delhi. An irrigated field here formerly yielded one wheat crop a year and lay fallow the rest of the time. The IARI scientists are now using it to grow four crops in twelve months — wheat, maize, mung beans, and either mustard or potatoes. In other plots they have various sequences of forage crops, pulses, soybeans, grain sorghum, cotton, and vegetables.

One interesting experiment involves sugar cane, a profitable crop that covers millions of acres in irrigated parts of India. But it is a slow starter and occupies the land for nearly a year. To the late Dr. S. S. Bains and his associates it seemed that the land and the sunshine could surely produce more than that. Hence, while the cane is small and growing slowly the scientists at IARI are planting eight kinds of vegetables between the rows — radishes, potatoes, beans, onions, cow-peas, tomatoes, eggplant, and a species of melon. All ripen quickly, after which the cane grows up to make a normal yield. In other experiments wheat and cane are growing together, in still others cotton and cane. In much of irrigated India sugar-cane farming may never be the same again.

Some of the unirrigated sections of the country can also benefit from multiple-cropping, although of course to a lesser extent. Those that receive twenty-four inches of rainfall a year may be able to harvest one additional crop, and those with fifty inches or more can sometimes get two extra crops. Among the crops best adapted to multiple-cropping in rainfed areas are pearl millet, finger millet, grain sorghum, peanuts, castor beans, and the grams.

[Extracted from Reaching the Developing World's Small Farmers, A special report from the Rockefeller Foundation, New York, 1974, pp. 39-43.]

POLLUTION CONTROL



CLOUDS OF POLLUTANT-LADEN SMOKE
POUR OUT OF AN INDUSTRIAL PLANT.

Pollution Control: The Philippines

Reynaldo M. Lesaca

[The Philippine government has for some years been engaged in an effort to reduce the destructive effects of pollution of its rivers and air caused by industrial and other activities. The methods used, and the kinds of problems encountered, are outlined, along with several case studies of both success and failure.]

Compared with Western industrialized countries, environmental deterioration in the Philippines is not extensive. It is rather intensive and confined to urban centers, chiefly Manila, and is caused both by the general public and by industry. Northeast of Manila lies the most polluted river in the nation. The Tinajeros-Tullahan River receives raw and under-treated domestic waste from a third of a million residents living in unsewered areas and raw effluents from some 20 industrial firms. This is in addition to 13 previously identified polluters who have, since 1970, controlled and minimized in varying degrees their discharge of untreated effluents. The Pasig River, the main navigable tidal waterway linking Manila with Laguna Lake and interior towns is grossly polluted — especially if total solids, turbidity, odor, and oil content are considered as criteria in addition to oxygen deficiency. Because the river is the only outlet of Laguna Lake, the lake itself is in danger of being polluted, especially during periods of drought and extremely high tides.

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Closely linked to water pollution are the rapid urbanization and subsequent housing shortages in areas around Manila and other chartered cities and capital towns. Squatting has become a serious national problem; studies show as many as 184,000 squatter families in the metropolitan Manila area. An estimated third of them live without sanitary facilities along the banks of the Pasig River and its tributaries, and discharge all their solid and liquid domestic wastes into the river. In urban areas no significant sewerage systems have been built since 1915, except in certain affluent subdivisions, and even where they exist the sewage is dumped raw or undertreated into the nearest waterway. It is fortunate that the Pasig River seasonally flushes most of its pollution into Manila Bay during the rainy season.

There are 31 other rivers in the country which are reported partly polluted or silted by industries such as mining firms, sugar centrals, distilleries, textile mills, pulp and paper mills, and food processing plants. Obviously these industrial sites were initially selected for their proximity to rivers, not only for transport but also for waste disposal. In some instances, land occupancy was nearly complete and there was no room for installing pollution control works when they were subsequently required.

Air pollution is less a problem than water pollution and is limited to urban and industrial centers. Motor vehicle emissions rank as the principal source of air pollution. Industrial air pollution also comes from cement plant stacks releasing lime and clinker dust; power, chemical, and fertilizer plants emitting sulfur dioxide and particulates; lumber yards, sawmills, and wood-processing plants giving off sawdust; and cigarette factories producing tobacco dust. Some 42 firms belonging to 10 groups were estimated to be contributing 13,420 pounds of particulates and 20,120 pounds of sulfur dioxide daily.

Again, it is rather fortunate that higher tropical temperatures and prevailing land breezes tend to remove the polluted air from over these urban centers. Moreover, the occurrence of atmospheric inversion is infrequent and of limited duration. Nevertheless, water and air pollution are beginning to be recognized, and the need for taking preventive action now cannot be overemphasized. Tables 1 and 2 summarize the industrial firms which contribute to environmental pollution.

The Pollution Control Law

With increasing public clamor, Congress eventually passed a pollution control bill which was signed into law on 18 June 1964. Section 1 of this law established national policy for maintaining reasonable standards of purity for the country's air and water. The law also defined certain terms, including pollution, sewage, industrial wastes, and treatment works. As defined, the term "pollution" is all-encompassing;

Table 1: Summary of Firms That Are Actual or Potential Sources of Water Pollution in The Philippines, 1971

Type of Industry	Number of Firms ^a		Number of Rivers and Water Bodies Affected
Beverage and bottling	44	(8)	4
Brewing	3	(2)	3
Chemical and fertilizer	53	(5)	3
Distilling	13	(8)	8
Edible and vegetable oil	21	(5)	5
Food	146	(8)	8
Leather	11	(2)	1
Mining	20	(20)	15
Oil	65	(3)	3
Pharmaceutical	31	(1)	1
Pulp and paper	37	(12)	10
Soap and detergent	33	(4)	4
Soy sauce	8	(3)	2
Sugar	30	(15)	15
Textile and Knitting	94	(13)	7
Wine and liquor compounding	21	-----	--
Other	114	----	--
Total	774	(109)	89

^a Numbers in parentheses indicate indicate firms for which data were available.

it is used to signify any alternation of air or water characteristics or discharge of substances into air or water that will or are likely to make it harmful to public welfare, for legitimate uses, or to wildlife.

The act created the National Water and Air Pollution Control Commission, an independent agency under the Office of the President rather than under the Department of Health or the Department of Agriculture and Natural Resources. The commission is composed of six members headed by an ex-officio chairman who is chairman of the National Science Development Board (NSDB). One member is designated by the Secretary of Health and another by the Secretary of Agriculture and Natural Resources. The remaining four commissioners

include two full-time (a sanitary engineer and a lawyer) and two part-time representing the private sector. Of the latter, one is recommended by the Philippine Council of Science and Technology (PHIL-COST) and the other by the Philippine Chamber of Industries.

Table 2: Summary of Firms That Are Actual or Potential Sources of Air Pollution in The Philippines, 1971

Type of Industry	Number of Firms	Number of Air Pollution Cases/Complaints	Number of Communities Affected
Cement	24	2	2
Ceramic and concrete	55	3	3
Chemical and fertilizer ^a	53	2	2
Flour	16	1	1
Galvanizing and anodizing	5	1	1
Glass	16	1	1
Household and industrial gas	20	1	1
Metal and casting	148	6	6
Paint and varnish	10	1	1
Paper ^a	---	2	2
Plastic and rubber	51	1	1
Plywood	20	2	2
Power	10	1	1
Rice	10	1	2
Soap and detergent ^a	33	1	1
Sugar ^a	30	4	4
Textile and Knitting ^a	94	4	4
Tobacco and cigarette	26	1	1
Wood processing and sawing	169	5	5
Total	790	40	41

^aThese firms are actual or potential contributors to both air and water pollution.

Section 6 of the law authorizes the commission to: determine the existence of pollution, promulgate appropriate rules and regulations, hold public hearings, issue orders requiring discontinuance of pollution, institute court proceedings, establish a permit system, and make investigations. The commission, furthermore, is directed to: encourage voluntary cooperation in the utilization and conservation of air and water resources, encourage formation and organization of groups which

may be causing pollution so that they can discuss and formulate plans for pollution abatement and prevention, serve as arbitrators for determining damages resulting from pollution, cooperate with other government agencies, prepare a national plan of pollution control and abatement, and collect and disseminate information on pollution control to the public.

Section 9 of the law details the prohibition against disposal of effluents and discharges into air of water that would result in pollution. Section 10 provides the penalties upon conviction of pollution — a maximum fine of P50,000 per day and/or imprisonment for a maximum of 6 years. The fine is obviously low, and it is a distinct possibility that certain industries may prefer to pay the fine rather than install pollution control works or improve their manufacturing processes to avoid pollution.

The commission can hold hearings and issue summonses and orders; orders for discontinuance of pollution can only be issued after a public hearing has been held. It must, however, go to court to compel compliance with its orders, for it has no police powers with which to compel a polluter to stop damaging the environment. Neither can the commission close an establishment apart from due legal process, even though pollution goes on unabated and those affected continue to suffer during the interim. It also has no jurisdiction over land, thermal, noise, or types of pollution other than water or air. Furthermore, the law requires that the permit and registration system be administered by district or city engineers, the former under the control of the Department of Public Works and the latter under the city mayors. In either case the commission has little, if any, power over them.

The Experience in Implementing the Law

Although the law was enacted in 1964, its full implementation was long delayed. Lack of funds prevented the hiring of even an acting technical secretary on a part-time basis until January 1966; a clerk was not employed until November 1966, and a helper not until May 1967. In February 1968 two full-time commissioners were appointed, and by May two part-time commissioners were also appointed, thereby completing the membership of the commission. The media helped, particularly the newspapers which agitated for the appointments so that the growing pollution problem could be properly handled. The commission has since been in continuous operation. A special science fund was established in 1969/70 with money received from the NSDB. Research personnel were hired with NSDB funds (25 in 1969/70, 26 in 1970/71, and 36 in 1971/72), and in 1969/70 equipment was procured and a small laboratory for analysis of water and air samples was established.

Complaints from affected parties flowed into the commission from the start of its operation. Although formal complaints must be sworn to, in order to eliminate unscrupulous harassment, the commission will also investigate general complaints if reasonable grounds for the existence of pollution seem to exist. Depending upon the personnel and funds available, the premises and operations of the suspected firm are studied as soon as possible. If the existence of pollution is verified, a conference is usually arranged between the parties concerned to discuss the problem. The commission provides general guidelines and suggestions and usually advises the firms to hire the services of sanitary engineers. The commission does not provide detailed pollution control steps since its policy is that the firm is responsible for solving its pollution problem. Should the conference prove ineffective, both parties are summoned to a formal hearing, with legal counsel if they wish. During this hearing the commission uses the findings of its technical staff to prove the existence of pollution and the firm is required to show cause why a discontinuance order should not be issued. Generally a formal agreement is reached and, depending upon the magnitude of the control works needed, sufficient time (1-12 months) is given for the firm to remedy the situation. In the interim, the firm is required by formal order to put up either temporary control devices (such as holding ponds) or to so time their discharge that it will not seriously affect the complaining parties (e. g., during low tides, in the case of liquid effluents released into a tidal stream affecting fish ponds). Periodic inspections are made to check on the progress of the work.

The commission has made every effort to allow industry to correct its own pollution problems, since its policy is not to harass industry nor to prosecute its owners or managers, but rather to require only those control works needed to reduce the pollution load of their effluents to safe levels. It is felt that water may be used for waste disposal provided the resulting quality does not exceed the standards set forth in the commission's rules to use the common resources affected. Only when the commission is convinced of the insincerity of a firm is legal action taken. As of June 1973, only three criminal and six civil cases had been brought to the office of the prosecutor for appropriate legal action, although several other cases are under study.

Through its full-time members, the commission confers with industry groups, schools, civic organizations, and professional societies. The laboratory personnel analyze effluents to determine the degree of pollution and the efficiency of any installed treatment works. In January 1971 an air-monitoring system for Greater Manila was installed to measure particulates, carbon monoxide, oxides of sulfur and nitrogen, and monthly dustfall. The main river flowing through Manila is also monitored for dissolved oxygen, BOD (parts per million of biochemical oxygen demand) total solids, pH, alkalinity, salinity, and

organic matter. A public information campaign emphasizing the problems created by uncontrolled pollution is continuously pursued. The following are among the more important accomplishments of the commission in its few years of existence.

1. The largest corporation in the Philippines, the San Miguel Corporation, whose principal product is beer, has completed and is satisfactorily operating its wastewater biological treatment plant. This was directly due to a commission order to stop its discharge of untreated wastes into the Tinajeros River in northern Greater Manila. The plant now utilizes a standard activated sludge process which cost P2.9 million. As a result the pollution load of its effluent was reduced by 98 percent. During the dry season flow, the incoming water is more polluted (due to other sewage and industrial waste) than the corporation's effluent. Before the treatment plant was constructed, SMC was estimated to be contributing 60 percent of the industrial pollution load of the river.

2. The 14 active mining firms continue to construct minetailings disposal systems at a total estimated cost of P37 million. Although this is an accomplishment, the damage wrought by mine tailings on agriculture and irrigation still remains and compensation must be made. Some mining companies are so located that it is virtually impossible to set up impoundments or decantation ponds. Plans to pipe their tailings into the sea are being considered. Whether this method is economically feasible or even desirable remains to be seen.

3. Ten other industrial firms originally discharging untreated effluents into the Tinajeros River have completed small wastewater treatment plants, at a total cost of P442,000. Although analysis reveals that the specified reduction in BOD values for the river have occurred, little physical difference is discernible by the layman.

4. A master plan for the control of pollution in the Pasig River which flows through Manila was formulated, approved, and is now being implemented — particularly those aspects that need no large appropriation, e. g., that every motor service station have an oil-water separation device kept in good condition.

5. A laboratory has been established and the acquisition of equipment worth P265,000 enables the commission to undertake routine analysis of collected samples, to monitor air and water quality, and to do regular research. Prior to this, the commission relied on other government laboratories, which resulted in delay and in interference with the other laboratories' work.

Case Studies in Pollution Control Effort

The following case studies illustrate typical commission successes and failures in the control of pollution.

Successful control of air pollution caused by a sawmill. Residents in a Manila suburb petitioned the provincial health officer on 26 June 1969 for the removal of the sawdust discharge pipe of a lumber firm. The petition received endorsements from several government agencies, but only after another petition was addressed to the Office of the President was the matter brought to the attention of the commission on 2 April 1970. The second petition was signed by 18 residents whose houses adjacent to the firm were affected by its noise, sawdust, and smoke.

Acting on the complaint, the commission immediately sent two of its engineers to investigate. An initial air sample showed that: sawdust blown from storage bins and dumps inside the lumberyard caused pollution of the air and irritated nearby residents; and the concentration of suspended particulates in the air around the mill and some of the complainants' houses exceeded values allowable for residential areas. The investigating engineers recommended: (1) improvement of the sawdust collection system, (2) regular disposal of sawdust and wood wastes, (3) proper housekeeping of the premises, and (4) registration of existing pollution abatement facilities and equipment with the commission.

After a hearing on 11 May 1970 in the commission's office, the firm was given one month in which to correct the problem. Meanwhile, the town mayor, who was present at the hearing, suspended the lumber company's mill permit until the commission and the complainants could certify that the mill's operations would no longer cause air pollution.

Follow-up inspections were conducted both during and after construction of the pollution control facilities. On 4 June 1971 the findings were as follows: (1) Emission of sawdust from the cyclones was not noticeable — indicating efficient dust collection. (2) Storage bins were effectively enclosed so that no escape of sawdust was possible. (3) Wood wastes were regularly hauled out of the plant. (4) Housekeeping was satisfactory. (5) A concrete wall (20-30 feet in height) now separated the plant from the adjacent complainants' houses. The report concluded that if such plant conditions were maintained, its operation would not contribute to any significant pollution. This case indicates how local officials, particularly town mayors, can help the national effort at pollution control.

Chronic air pollution caused by a cement plant. A Portland cement plant located in a remote barrio of Norzagaray is the biggest such plant in the country. The first complaint against the firm was a letter to the Department of Health by the chairman of the National Economic Council,

the top government economic planning body, on 18 May 1964 (before the commission was organized). It stressed the heavy limestone dust fallout in the neighboring industrial estate where people lived and the possible ill effects on the health of this community. Subsequent complaints were received from (1) the Peoples Homesite and Housing Corporation in 1966, a government agency which was putting up a housing subdivision in the general area affected by the dust fallout, (2) the governor of the province in 1968 who reiterated the complaints of the nearby barrio residents, (3) a citizen in 1969 who reaffirmed the original complaint of the affected residents, and (4) a homeowners association of an adjacent barrio in 1970.

The first investigation was made on 28 May 1964 by the Stream and Air Pollution Control Unit of the Department of Health. They found that the areas southwest of the plant were adversely affected by the excessive limestone dust emission during the dry season (when the northeast monsoon prevails), even though the two kilns had an electrostatic precipitator and all other stages had bag filters. Six subsequent inspections confirmed these findings, and the management, apprised of the results of each, promised improvements.

One of the commission's first acts in 1966 was to refer the second complaint to the Department of Health for investigation since the commission was still in the organizational stage. Engineers of the department conducted the inspection and reported that kiln stacks 1 and 2, provided with electrostatic precipitators, were still emitting excessive dust, though the estimated collection efficiency was 95 percent. Work to reach the desired level of 99 percent was underway and was to be completed by April 1967. The bag filter for kiln 3, on the other hand, was working satisfactorily.

Because of similar complaints about cement plants all over the country, in December 1968 the commission called a conference with the members of the Cement Association of the Philippines. At that meeting the commission explained the provisions of the law and asked the cooperation of the cement industry in minimizing and controlling pollution.

Because of continuing complaints the commission scheduled a formal hearing for June 1970 to determine whether the Norzagaray firm was making any efforts to correct the situation. The firm's representative reported the difficulties they were encountering and the efforts they had exerted in trying to solve their problem. They had secured a technician from the German manufacturer of their equipment, but even he could not solve the problem immediately.

The problems encountered by the plants in installing and satisfactorily operating their dust control works appear to be mainly

technological rather than financial, as in other cases. The company's expenditure of more than P5 million to solve the problem attests to this. The commission was sympathetic but nevertheless warned that should it find the firm unable to control the excessive dust emission within a reasonable time it would be forced to take legal action.

Siltation produced by a copper mining company. Investigation of the pollution of Sipalay River was prompted by the complaint of the municipal mayor of Sipalay through a resolution of the municipal council. It was asserted that the river was being heavily polluted by the operations of a large mining firm, which in turn was seriously affecting the town's agriculture and fishing. The commission survey in November 1968 confirmed the mine's siltation of the river to its mouth. Accordingly the plant superintendent was advised to take the necessary steps to minimize or eliminate such pollution.

The company processed about 15,000 tons of ore daily. From this, only about 500 tons of concentrated ore was recovered and the rest was dumped into the river. At the start of operations in 1958, a small tailings pond was built to take care of its industrial wastes. The first pond was adequate for the quantity mined, but expanding production soon filled it.

Analyses of subsequent samples showed the river water to be still heavily laden with mine tailings; the commission therefore called a formal hearing in June 1969. The complainants reiterated their difficulties: They could no longer use the water for agricultural purposes, and adjacent ricelands were being ruined by the accumulating silt. The company counsel and field engineer claimed, however, that they were doing their best to control the flow of unsettled water but that tailings still managed to escape into the river. After assessing the facts, the commission in February 1970 ordered the company to stop discharging untreated wastes into the river.

Five days later, the company requested reconsideration and postponement of the order's execution for two years. The request was supported by a resolution of the town council, which apparently had been mollified by company promises to construct several roads and school buildings. Even the governor and a member of Congress from the province interceded on behalf of the company. The company labor union also sent an urgent appeal to the president requesting reconsideration of the commission's order which, they said, was tantamount to closing the mining operations depriving the workers of jobs. The commission, after thorough study of all known factors, denied the request for reconsideration in May 1970.

As a result of the commission's action, which was not to stop operations but merely the discharge of mine tailings into the river, the

company rushed to complete its work on a new lagoon and holding ponds. A follow-up survey made in May 1971 indicated that only siltless supernatant water was piped to a pumping station downstream of the decantation pond. Some of this clear water was reused by the company, the excess being discharged into the river. The latest inspection showed pollution from siltation to be apparently under control, although the affected parties have gone to court to collect damages resulting from the mining company's previous activities.

Thus a strong stand by the commission forced a polluting firm to rush its completion of a temporary lagoon and to complete its permanent decantation ponds in due time.

Conclusion

The Philippine experience demonstrates that the enactment of a pollution control law does not guarantee an immediate solution of the pollution problem. Rather it marks the beginning of the government's determined efforts to curtail the ill effects of pollution before it gets out of hand. The absence of such a law until long after industrialization started and the inability of government to provide necessary domestic sewerage systems are mainly responsible for the prevailing state of pollution. The reluctance of industry to set up the needed control works is understandable, and the persuasive approach adopted by the commission appears desirable, logical, and workable. Until 1971 lack of funds prevented the commission from retaining more than one lawyer; it was therefore unable to take many court cases. Moreover, local prosecutors and officials, often unacquainted with the law and sympathetic to industrial firms because of tax money and other benefits they bring into the area, tend to be cautious if not reluctant to take any precipitate action against them. The result is a prolonged action and delay in the construction of the much needed pollution control works.

The case studies illustrate the following: (1) If local officials are determined, they can effect compliance with commission orders by erring industries. (2) If factories are allowed by local officials to be established in or near residential areas over the objections of residents, the commission efforts to control the resulting pollution are dissipated in undertaking frequent surveys to determine the extent of pollution at the time of litigation. (3) The ability and willingness of a firm to allocate funds for pollution control is no guarantee that the problem will be solved right away; it may take more expertise or more sophisticated equipment to bring the pollution levels down to the commission's standards. (4) Even if a pollution problem is satisfactorily solved, the damages previously suffered must still be considered and courts must award just compensation to the affected parties.

Unless the government gives it more financial support, the commission, the only national agency engaged in pollution control work, cannot employ the needed technical and legal staff, and the existing law cannot be enforced properly. Congress must also pass certain statutory amendments in order to give more power to the commission and to prosecutors and judges. Some individuals in the industrial sector claim that the government should improve pollution control by constructing new sewers and extending old ones. Because of inadequate financial resources, the government cannot do this immediately — nevertheless, a start has been made. In the final analysis the public can and must exert pressure on their elected representatives and the government to insure that the pollution control agency is provided with the funds and legal powers to strike a happy compromise between industrial and economic progress and the preservation of the environment.

[Extracted from "Pollution Control Legislation and Experience in a Developing Country: the Philippines," The Journal of Developing Areas, Vol. 8, No. 4, July 1974, pp. 541-56. Copyright © 1974 by Western Illinois University.]

Pollution Control: Considerations for National Action

United States Government

[This report, prepared for the U. N. Conference on the Human Environment in Stockholm, 1972, describes the kinds of measures that governments can take to control pollution.]

Actions to control pollution have been taken for a long time by many countries in such areas as water and sewage treatment and food contamination. Nations, however, are now faced with greatly increased needs for pollution control activities in these and other areas. Experience in meeting these needs is limited, and governmental actions are still largely in the formative and preliminary stage. What follows does not purport to be a comprehensive description of these experiences with pollution control but rather attempts to identify some of the major issues which are already apparent. There are as yet few, if any, rules to guide pollution control actions of governments in all cases. One country's successful experiences may or may not provide useful guidelines for another country. Differences in levels of development and differences in socio-economic systems will be particularly important in determining appropriate actions. Nevertheless, knowledge of what others are doing and of new ideas being advanced may be useful stimulants to planning in all countries.

A wide variety of economic and other measures exists for use at the national level for controlling pollution. Some, like mandatory compliance with standards, have been widely used for many years; others, such as discharge warrants, have been little used and are still largely in the formative stage. The utility of these measures depends on the goals which pollution control is designed to achieve. These goals generally take the form of standards: quantitative specifications of the maximum permissible levels of pollutants to be emitted or to be

present in specific situations. They constitute the levels to which contaminants should be reduced or ceilings which should not be exceeded. They may also specify how operations are to be conducted or how products are to be made, or used.

Brief descriptions of selected measures follow. They are divided into groups to illustrate the fundamental differences in approach that can be taken in developing pollution control strategies: direct regulation, charges, other compulsory measures, and incentives. No matter what measures are adopted, administrative problems can be expected in their execution and follow-up. Although their rational application depends on the prior setting of definite goals, efficient application is only likely if there is continual review and revision of these standards to accommodate new scientific findings and technological advances. In general, experience has indicated that two or more measures used in combination are more effective than one measure used alone. Selection will be influenced by national policies regarding who should pay for pollution control; selection should allow for the need to integrate these measures into the national planning framework.

It needs to be borne in mind that experience of pollution control is still limited in even the most highly industrialized nations, and several of the measures suggested below have hardly, if ever, been tried on a national scale. In general, it can probably be said that incentives tend to distribute costs to all, or part of, any given community, while charges tend to distribute costs directly to polluters or to users of polluting products and services. It should be appreciated that the statements that appear below relative to each group of control measures must be regarded as only illustrative: measures that may be suitable in one country or under one set of socio-economic conditions may not be applicable elsewhere. If only for this reason, there is an urgent need for exchange of information about the success or failure of whatever measures are adopted in different countries.

Direct Regulations

Mandatory standards. Standards can either be used as guidelines, or made compulsory. To be effective, mandatory standards must be realistic and require the establishment of workable inspection systems and effective enforcement procedures. At the national level, standards are usually enforced, if necessary, by court orders and subsequent litigation and penalties. The following general observations may be made about the use of mandatory standards in pollution control: on the plus side, they are relatively straightforward compared to many other control measures; they can be used to provide uniform conditions for all enterprises serving the same market, and thus "take the environment out of competition"; their adoption places the costs of pollution control directly on firms or industries and on the consumers of their products;

and they enable penalties to be adjusted (at least theoretically) to levels needed to stimulate compliance. On the other hand, they create no incentive to reduce pollution below the statutory levels, and they may result in inefficient patterns of operation being adopted in order to conform to the set standards.

Complete prohibitions. Disallowance of either the discharge of a pollutant or of activities that lead to such a discharge is termed "complete prohibition". Since the environment has the capacity to assimilate certain pollutants without unacceptable risks, complete prohibition has been used on a highly selective basis, such as barring of certain types of pesticides, and port regulations which prohibit the admission of oil tankers which do not conform to established standards laid down. Prohibition may also be temporary, as when incineration is banned locally during adverse meteorological conditions.

Licenses or permits. Licenses or permits can be required of persons or enterprises wishing to engage in polluting or potentially polluting activities. Prices of licenses or permits can be based on the type of polluting activity being licensed or on the basis of competitive bidding. Licensing has the advantage of permitting periodic identification of polluters and of amounts of pollutant discharged. It also provides a means for restricting the number of enterprises engaged in polluting, or potentially polluting activities, and for controlling their equipment, process and training procedures. However, it has the tendency to favor financially strong enterprises rather than those producing low levels of pollution.

Discharge warrants. Discharge warrants are negotiable instruments sold by a control agency to the highest bidder. They permit their owners to discharge specified quantities of pollutants into the air or water for specified periods of time. Quality of air or water standards are translated into permissible quantities of discharges of various pollutants allowable under the standards. Discharges permitted by all warrants issued total permissible quantities under the standards.

Land use controls. Through zoning, performance specifications, and building codes governments can specify uses to which land can be put and place restrictions on those uses. Such controls can prevent air-polluting facilities from locating in stagnant-air basins, noise- and odor-polluting facilities from locating near residential areas, etc. To discourage loss of prime agricultural land, high prices can be set on farm land sold for non-agricultural use.

Best practicable means. Governments may require that the "best practicable means" approach be applied to the provision, efficient maintenance and proper use of appliances for preventing the escape

of contaminants and the proper supervision of operations causing such emissions. This concept takes into account the effect of such measures on the operation of the process and their cost, since it attempts to preserve a balance between the amount of money to be spent and the degree of harm or nuisance involved. The obligation to use the "best practicable means" is continuing and may entail alterations in plant and method as new techniques become available. In a few cases the aim is to eliminate emissions altogether, but this is seldom practicable. In general, standards of good tolerance have been drawn up which experience shows are attainable by the use of plant if it is carefully supervised and operated. The standards are revised as improved techniques become available.

Liability (and insurance). The knowledge that suits for pollution damages are distinct probabilities under certain conditions serves as a deterrent to polluters and potential polluters. If potential damages are insurable, then damage payments cease to be a direct deterrent, but they may be replaced by operational standards imposed by the insurer. Unless certain standards are met, no insurance or only very expensive insurance may be obtainable. In a number of countries lawsuits are increasingly seeking injunctive relief to force prevention or abatement rather than seeking damages.

Financial

Effluent charges. Where pollutant discharges into public sewers or into water or the atmosphere can be measured and monitored, charges can be imposed by a control agency. Enterprises can decide to pay the charge or tax, reduce the level of activities causing pollution, or undertake pollution control measures such as treatment of wastes and recycling. The desired level of environmental quality can be met by adjusting the level of charges. The higher the charge, the more likely the polluter is to reduce pollution. Revenues produced by the charges can be used for abatement, damage clean-up, research on pollution control, etc. A variation of effluent charges is privilege-to-damage payments, such as payments by airlines to residents who suffer from excessive noise under airport traffic patterns. A number of factors may influence the decision to adopt the effluent charge system: 1) they are theoretically an efficient system under certain conditions; 2) they provide continual incentives for the abatement of pollution by its producers, and for the highest level of abatement per unit cost, and 3) they allocate resources efficiently by allowing product prices to reflect waste disposal costs and by permitting polluters to determine individually their "best" solutions; on the other hand, they may not only result in lengthy delays in reducing pollution if initial charges are set too low, but they may also involve sizeable costs in setting charges on a rational basis and in monitoring discharges.

Levies on uses of polluting products. A variety of charges can be made on the use of such polluting substances as leaded gasoline, high sulphur coal, and non-returnable containers. The levies can take various forms such as taxes to discourage use or deposits to encourage recycling. Graduated taxes can be placed on horsepower of internal combustion engines to encourage use of smaller engines with lower fuel consumption and reduced pollution. In some applications, levies are useful devices for indirectly influencing market behavior when it is too difficult to monitor and charge effluents more directly. As compared with the other systems discussed above, levies provide means for selectively discouraging the use of certain pollutant materials; and are potentially flexible in that they can be adjusted to produce the desired behavior. However, they have a limited range of applications and are subject to accusations of discriminatory treatment.

Other compulsory measures. A variety of other compulsory measures are available for promoting environmental quality, including boycotts, withholding loans from local authorities, fines, moral suasion, and adverse publicity.

Incentives

Soft credit terms and grants. Governments can stimulate investment in pollution abatement techniques and equipment by granting interest-free or low-interest loans; or grants. The degree of incentive implicit in a loan can be increased through partial or total waiving of principal repayment. In the latter case, the loan becomes in effect a grant. The degree of incentive also varies with the amount of the loan or grant, and this in turn can be tied to progressively improved performance in reducing polluting effluents.

Tax incentives. Governments can provide tax credits, tax relief or accelerated depreciation for investment in abatement equipment in industrial plants if these are located and performing in conformance with environmental planning criteria. The degree of incentive can be determined by credit or depreciation terms. Tax incentives, however, can only be used in countries with well-developed tax structures. They have certain advantages in that they require minimum administrative burden since they rely largely on responses rather than on detailed bureaucratic decree, can be implemented with limited time delay, and help to soften the direct burden of initial expenditures for pollution control on enterprises and communities.

Awards and recognition. The use of awards and public recognition as instruments to change values and to motivate desired action can be significant stimulants for environmental action by individuals and

public and private organizations. Awards can be monetary or they can be symbolic in nature, such as certificates or medals. They can be given for outstanding environmental achievements or for winning environmental competitions.

Other subsidies and compensations. These may take many forms, such as dislocation allowances; payments to persuade a party to use a high-priced, low-polluting, substitute for a low-price, high-polluting, substance; and use of government purchasing power to stimulate development and markets for innovative pollution control devices, processes or designs. In general, subsidies may be useful because they can accommodate specific needs of individual cases and they tend to reduce objections to pollution control regulations on the part of firms causing pollution. At the same time, however, they may result in long-term distortions of relative prices and present difficulties in determining the sizes of subsidy necessary to motivate action in any given instance.

[Excerpted from Documents for the U. N. Conference on Human Environment. Stockholm, June 5-16, 1972. Part II. Washington, D. C. : U. S. Department of State, March 1972.]

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